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SURGICAL TREATMENT OF GALL BLADDER DISEASE IN DIABETICS

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[From the New England Deaconess Hospital Clinic]

PROBABLY no patient is more neglected from a surgical point of view than is the diabetic. Likewise in no patient is surgery at times of so much importance as it is in this same group. For generations the teaching has been handed down that diabetics should not be operated upon because of a very high mortality, and surgery therefore has been limited almost entirely to cases of absolute necessity.

To be sure Joslin has, for a number of years, called the attention of practitioners to the fact that diabetics could be operated upon with comparative safety if they were properly prepared before operation and were given proper attention after operation. Among Joslin's surgical cases before the introduction of insulin there were, besides the operations for carbuncles, abscesses, and gangrene, various "deliberate" operations such as Caesarean sections, operations for cancer of the various organs, cataracts, exploratory laparotomies, operations for gall stones, haemorrhoids, hernia, fibroids, mastoid infections, enlarged prostates, hyper-thyroidism, ventral suspension, and many others. Since the introduction of insulin the scope of surgery has increased very much and many patients who were formerly refused operation can now be operated upon with comparative safety. Joslin's figures[1] show that the mortality of "deliberate" operations before 1917 was 18% while in sixty-one operations since 1919 the mortality has dropped to 9%. Adams and Wilder[2] from the Mayo Clinic report 327 operations, 141 of which were major procedures with a mortality of 1.2 per cent. Among the conditions which can and should receive proper surgical treatment is gall bladder disease.

As to the incidence of gall stones, Joslin reports seventy-three cases in a total of 3382 cases or 2.2%. While this number seems to be large we are quite convinced that the incidence is much greater than this, when we consider the number of cases entering the Deaconess Hospital in the last six months. Many cases are undoubtedly never sent to the hospital because of the long established habit of thinking that such cases cannot be operated upon.

What is the relation of gall stones to diabetes? This is a question which we are not competent to answer. We know that many cases improve remarkably after removal of gall stones, and this improvement in the diabetic condition is not temporary but permanent. Joslin, Allen, Brigham, and others have reported such cases in detail. But is such improvement due to the removal of a cause of diabetes or is it due to the removal of a source of irritation or infection, such as follows the removal of any infection? Eustis[3] states that of thirty-six cases of so-called alimentary glycosuria fifteen showed definite gall stone disease. Joslin[4] has shown that the average age at which a diagnosis of gall stones was made in his seventy-three cases was forty-six years, while the age at the onset of diabetes in these same cases was forty-eight years, that is, the gall stones preceded the diabetes by two years at least.

Whether we believe that gall stones have a causative relation to diabetes or not it is quite evident from a long series of cases that the diabetic condition is generally improved by the removal of them. Perhaps Joslin's advice is as good as any we can give; he says: "My advice to non-diabetic patients with gall stones is to be operated upon not only because of the danger of repeated attacks of gall stones and the danger of subsequent carcinoma, but also because of the danger of diabetes. In diabetic patients my advice is to have gall stones removed when the conditions of time, place, surgeon and physician are all propitious."[5] Of the seventy-three cases of gall stones seen by Joslin there were but twenty-seven or thirty-seven per cent operated upon. We believe that this percentage should be increased very much, for we believe that there are many cases of gall stones in diabetics which are never sent to the surgeon because of the teaching that the dangers of operation are too great. We do not expect to counteract the influence of that teaching at once, nor de we wish to infer that even with the use of insulin there is no danger; but we would like to impress upon the medical public that with proper care these patients can be operated upon with a mortality only slightly greater than in normal individuals. While there may be some added risk to diabetics who are operated upon, we must remember also that the dangers to the diabetic of waiting in gall bladder disease are considerably greater than to the normal individual, and at the same time the benefits of operation are correspondingly greater.

When we speak of the added risk to which diabetics with gall stones are subject, we refer not only to the fact that the diabetic condition is made worse, but more particularly to the fact that these patients do not react well to septic processes and therefore go on to a serious condition before it is appreciated. It is well known that diabetics seem to have less pain and less inflammatory reaction in septic processes than normal individuals. An abscess seems to cause little discomfort and cause comparatively little reaction; an ulcer with infection about it may cause considerable reddening, but the other signs of inflammation are comparatively mild; the process, however, goes on and is difficult to stop. In the cases of acute appendicitis seen by us the case proceeds to abscess formation, unfortunately for the diagnosis, with comparatively little disturbance. This is also true in infections of the gall bladder. A simple ulceration of the gall bladder due to stones goes quietly on without any apparent effort at healing. Several cases operated upon by us have before operation appeared to be quite simple, but at operation empyema of the gall bladder and extensive destruction of the gall bladder wall and surrounding structures have been found.

By far the most satisfactory cases have been those in which the symptoms have been of short duration or very slight, and those in which gall stones have been found accidentally by routine X-ray examinations. Preventive surgery in such cases in diabetics is, we believe, not only justifiable but rational.

This brings up the question as to the time most favorable for operation. We believe that gall stones should be removed as soon as the diagnosis is made from the history, or without it when a positive diagnosis can be made by the X-ray. Acute cholecystitis should be treated the same as infections of any kind in diabetics; that is, as an emergency. For some reason or other there is a feeling among certain men that no case should be operated upon until the patient is sugar free, while we believe that any source of infection should be removed at once and the diabetes treated later. Unless the patient is seriously ill sufficient time should be taken to make sure that the patient is well supplied with fluids and carbohydrate, as suggested later in this paper. It is impossible to improve the condition of the patient permanently so long as there is a septic process about him. We believe that diabetics are much more prone to infection of the blood stream than normal individuals. In gall bladder infections as in all other infections in diabetics, a blood culture should be made before operation, for the satisfaction of the operator at least.

What anaesthetics should be used in this particular group of cases? The answer to that question depends much upon individual experience We believe that spinal anaesthesia in all operations upon the extremities gives by far the best results, and if it could be used with the same safety in gall bladder cases we should use it; but we do not believe that it can be. Gas oxygen we consider the next best anaesthetic for many diabetic conditions; but in surgery of the gall bladder, it produces insufficient relaxation, and incidentally forced respiratory movements which make the operation so difficult that we regard it as dangerous and have therefore discarded it very largely in these cases. At the Mayo Clinic[6] ether is used as the anaesthetic in most of their diabetic patients and their results would seem to indicate that it is not a dangerous anaesthetic. We would call attention, however, to the fact already pointed out by Fitz[7] that the amount of ether used in Rochester is much smaller than in most clinics elsewhere. Ether administered to normal individuals or animals gives rise to a hyperglycemia and acidosis. Sansum and Woodyatt[8] have shown this increased blood sugar to have its origin in liver glycogen. Bloor[9] found a rise in blood fat during ether anaesthesia of normal dogs, varying from 40 to 100 per cent. Moreover it is a well known clinical fact that there is more nausea and vomiting with ether than with gas oxygen, spinal, or local anaesthesia. This is of importance because of the consequent interference for many hours with intake of food and even liquids. Vomiting also increases the tendency to ketosis. We are of the opinion therefore that Joslin's statement still holds good that "ether anaesthesia is a burden which a light case of diabetes may easily bear, which may change a moderate to a severe case, and to a severe case prove fatal."[10] We have had no experience with ethylene. It has apparently been the experience of other clinics where it is extensively used that relaxation is not sufficient, without the addition of ether, for comfortable gall bladder surgery. At present we are using with considerable satisfaction local anaesthesia with novocaine for the opening and exploration of the abdomen, followed by light ether anaesthesia, if necessary, for the removal of the gall bladder. The ether is removed after the gall bladder is extirpated, and the wound closed under local anaesthesia. A simple cholecystostomy can be done quite easily under local anaesthesia alone. It is often stated that infection of the wound is more likely to occur with local than with general anaesthesia. This has not been our experience.

What type of operation shall be done in diabetics? In many cases of gall stones it is not only justifiable but necessary to do a simple cholecystostomy. This can often be done under local anaesthesia alone and can be done in a much shorter time, with much less injury to the tissues, than a cholecystectomy. It is true that removal of a septic gall bladder, if it can be done without infecting the area of operation and without too prolonged an effort, will permit the patient to return to normal much quicker than after a cholecystostomy. A cholecystostomy will, in cases of badly infected gall bladders, remain a source of infection for a long period of time. It is true also that in certain cases of cholecystostomy, where there is not free drainage of the gall bladder through the cystic duct, the gall bladder may remain the source of infection, at intervals, for an indefinite period.

Cholecystectomy may be considered the operation of choice in those cases in which the gall bladder can be removed without too great damage to the liver and surrounding organs, and when it can be done without prolonging the operation unduly. A short operation with little injury to tissue is essential in all operations on diabetics.

We are convinced that success in operating upon diabetic patients results only when there is smooth inter-relation of the following factors: (1) comprehensive coöperation between surgeon and internist; (2) careful pre-operative study and preparation; (3) judicious selection of the anaesthetic, and of the type of operation; (4) vigilant post-operative care; (5) insulin. We would agree most heartily with the statement of Adams and Wilder of the Mayo Clinic that "As important as insulin, if not more so, has been the care and precision of pre-operative treatment,"[11] and we should add; of post-operative treatment.

In preparing the diabetic patient for operation, radical procedure designed to render the patient sugar-free may cause actual damage by depleting the glycogen content of the liver and other tissues and thus destroying a valuable protective agency. It may even be desirable to have small amounts of sugar in the urine at the time of operation for then depletion of the carbohydrate reserve seems less likely to be present.

Acidosis is much less desirable than large amounts of sugar in the urine. Unless operation is imperative it should be delayed until the acidosis is controlled. Emergency cases may be successfully operated upon in the presence of acidosis but the responsibilities of the surgeon and internist are thereby greatly increased and the prognosis proportionately poorer. From the viewpoint of operability, diacetic acid in the urine is a satisfactory index of acidosis.

. Adequate fluid intake is essential. The patient's tissues should be neither dehydrated nor water-logged for either condition may prevent proper metabolic response to the unusual burden imposed by the operation. Unless the patient is very dry and dehydrated, from two to three liters of fluid a day for two days is probably adequate preparation. If fluids cannot be retained when administered by mouth they may be given by rectum, subpectorally, or intravenously.

The diet should contain eighty to one hundred grams of carbohydrate each day for at least two days immediately preceding the operation. The protein should not exceed one gram per kilogram body weight of the patient. The fat content of the diet should be low, thereby diminishing the possibility of ketosis by limiting the number of fat radicles to undergo incomplete splitting. Fifty to seventy-five grams of fat a day are adequate and in some cases much less may be given. The following diet adequately meets the pre-operative requirements of the average gall bladder patient who is not too ill to eat. It contains approximately one hundred grams of carbohydrate, forty-five grams of protein, and fifty-eight grams of fat.

Breakfast	*Dinner*	*Supper*
One-half grapefruit	One small piece of meat	One egg
One large dish of oatmeal	One Uneeda biscuit	One Uneeda biscuit
Three ounces of milk	One small butter ball	One small butter ball
One egg	Two ounces of milk	One Shredded Wheat biscuit
One Uneeda biscuit	One small orange	Three ounces of milk
One small butter ball		One small orange

Tea, coffee, cocoa shells and saccharine as desired

If the patient is too ill to eat the above menu, carbohydrate must be persistently administered in small increments in the form of liquids given by mouth and by rectum. Two, six ounce rectal injections of ten per cent. glucose solution, ten ounces of orange juice, a pint of oatmeal water gruel and half an ounce of levulose sugar in tea or in the gruel are equivalent to one hundred and one grams of carbohydrate and we have experienced no difficulty in administering these slowly throughout the twenty-four hours. The oatmeal water gruel is made by re-heating eight ounces of cooked oatmeal, the equivalent of one ounce of dry oatmeal, in one pint of water, straining out the husks and diluting the gruel to the desired consistency. We have never found it necessary to resort to the intravenous injection of glucose. Insulin should be used to prevent undue accumulation of sugar in the urine. Two hours before operation, five ounces of the orange juice are given by mouth.

On the day of operation the usual morning dose of insulin should precede by thirty minutes the one hundred and fifty grams of orange juice given two hours before operation. To give large doses of insulin just before the operation is both unwise and unnecessary. The production of sugar and acid can be adequately controlled after the operation and it is unnecessary to subject the patient to the dangers of hypoglycemia. Insulin should be used to control the amount of sugar and diacetic acid in the urine and to enable the patient to take from eighty to one hundred grams of carbohydrate each day but no more should be expected of it before the operation.

After the operation minute attention to detail is essential and for this reason a special nurse is very desirable although not indispensable. The more diabetic training the nurse has the more intelligent will be her care of the patient, but any well trained nurse can carry out the simple procedures necessary. The usual watchfulness accorded the operated non-diabetic patient should be redoubled for the diabetic. Nothing should be left undone to make him comfortable and to relieve him of every conceivable burden for he will convalesce in direct proportion to the size of the load he is called upon to carry.

A single specimen of urine is obtained every three or four hours after the operation and is tested for sugar by the Benedict test and diacetic acid with ferric chloride. If necessary a self retaining catheter may be inserted and in this case specimens may be obtained at any interval. It is best not to delay more than three hours if any doubt exists about the patient's condition. If a catheter is used, hexamethylenamine should be administered. These single specimens, as obtained, are tested by the nurse who then administers insulin on the basis of the qualitative results. The amount of sugar may be quantitated if desired but this adds no helpful data. The single specimens should be carefully preserved in order that the twenty-four hour urine specimen is not depleted.

Insulin is administered subcutaneously on the basis of the qualitative tests for sugar and diacetic acid in the urine. We have never found it necessary, in operated cases, to inject insulin intravenously. If the Benedict test for sugar is red, brown, or yellow and no diacetic acid is present, fifteen units of insulin may be given, but if diacetic acid is also present, twenty units may be administered. If the Benedict test is green, five or ten units of insulin may be given. In general, more insulin may be safely given in the presence of diacetic acid than when it is absent. It is not necesasry to follow each dose of insulin with carbohydrate ingestion. We make no effort to give enough carbohydrate after each dose of insulin to utilize all the insulin administered and must therefore maintain closer watch of the patient than is otherwise necessary, but when the insulin dosage is carefully gauged against the sugar and diacetic acid in the urine we have met with no difficulty. We are, however, continuously feeding small quantities of carbohydrate as will be shown later. These procedures may be carried out every one, two, three or four hours, depending upon the urgency of the indications. We have met with excellent success working on a three-hour schedule. We are not concerned if the patient does not become immediately sugar-free. Very often this state is not reached for several days after operation. If the sugar and diacetic acid in the urine are under control and not increasing in amount we are satisfied to work more conservatively, feeling that rapid changes in the metabolism of the patient are not always desirable. As convalescence progresses the insulin requirements become less and less and it is often possible to dispense with it entirely.

Blood chemistry does not often play an important role in the post-operative care of a diabetic patient. Occasionally a case is encountered in which a knowledge of the blood sugar or the carbon dioxide combining power of the blood results in real benefit to the patient, but such cases are exceptional. We have not found it necessary to make blood sugar and carbon dioxide determinations a part of the post-operative routine. The simple tests for sugar and diacetic acid in the urine have usually supplied all the data necessary for adequate treatment. If urine specimens cannot be obtained, however, the blood offers the only other means of supplying the data necessary for the direction of the treatment.

The amount of fluid required after operation varies a great deal. Probably no patient should receive less than fifteen hundred c.c. during the first twenty-four hours. More may be given depending upon the degree of acidosis present and the general condition of the patient. We always put six ounces of tap water into the rectum every four to six hours during the first twenty-four hours following operation. The patients begin to take small amounts of water by mouth just as soon as they ask for it but great pains are taken to prevent vomiting for this always increases acidosis. We try to attain a daily fluid intake of from two to three liters as soon as possible after the operation. We have not yet found it necessary to use the intravenous route but subpectoral salt solution has proved of great value.

During the first twenty-four hours after operation we have found it desirable to administer from forty to sixty grams of carbohydrate. In cases showing considerable diacetic acid it may be advisable to give more than sixty grams because acidosis is the result of incomplete splitting of the fat and fat can be completely split only in the flame produced by the burning of carbohydrate. One pint of oatmeal water gruel containing one-third ounce of levulose supplemented by ten ounces of orange juice contain sixty grams of carbohydrate. It is usually not difficult to feed these amounts in teaspoonful increments but their volume may always be reduced by resorting to glucose solution by rectum. Equal parts of milk and vichy have proved very acceptable to some patients. Such a diet contains almost no fat and is therefore very desirable for the gall bladder case. We give no thought to the protein content of the diet at this stage of the treatment. Sometimes the whites of two or three eggs are added to the orange juice but this is done, not so much for the protein as to make the orange juice bland.

TABLE I

Case	Sex	Age	Pathology	Operation	Insulin	Results
M. Y.	F	54	Empyema	Cholecystectomy	0	Relieved
P. W.	F	44	1 stone	"	0	"
G. R. M.	M	55	Stones	"	0	"
S. R. M.*	M	58	Stone in common duct	Choledochostomy	0	"
E. W.	F	47	Stones	Cholecystectomy	0	"
C. W.	F	59	Perforation Local abscess	"	+	"
S. M.	F	45	Perforation Local abscess	"	+	"
A. G.	F	68	Contracted G. B. Stone in com. duct	Cholecystostomy Choledochostomy	+	"
M. N.	F	57	Stones	Cholecystectomy Appendectomy	+	"
A. K.	F	53	Perforation into liver and duodenum	Cholecystostomy Closure of duodenal fistula	+	"
T. K.	M	28	Stones	Cholecystectomy	+	"
E. N.†	F	45	Stones	Cholecystectomy	+	"
E. N.‡	F	53	Stones in G. B. and com. duct	Cholecystectomy Choledochostomy	+	"

*Cholecystectomy done three years before. Returned with symptoms of stone in common duct.
†We are indebted to Dr. R. H. Miller for the privilege of including this case.
‡We are indebted to Dr. F. H. Lahey for the privilege of including this case.

The day following operation the diet remains almost the same as the first day, but thereafter milk, cream, uneeda biscuits, butter and eggs are added as rapidly as possible until the patient is taking his full maintenance diet. Meat, bacon, vegetables, and cheese are added very conservatively. In our experience it has taken from seven to ten days to reach a maintenance diet composed of the simple, easily digested foodstuffs. Bulk and overloading the stomach should be carefully avoided. About twenty calories per kilogram body weight are adequate for the average bed patient. We have found it unnecessary to feed one gram of protein per kilogram body weight in order to obtain rapid healing of the wound. As already indicated, the fat in the diet is kept at a low level during the convalescence of these gall bladder cases.

SUMMARY

1—Gall stones are frequently present in diabetics. Operation is especially indicated in the diabetic, but many are not operated upon owing to the teaching that the dangers of operation are too great. We believe that the diabetic patient can be operated upon for gall stones with practically no more danger than the non-diabetic patient, provided all conditions are propitious. The evidence supports the statement that preventive surgery in diabetics is not only justifiable but rational. Gall stones should be removed as soon as a positive diagnosis can be made, and acute cholecystitis should be treated the same as infections of any kind in diabetics, that is, as an emergency.

2—The desirability of various anaesthetics is discussed. At present we are using with considerable satisfaction local anaesthesia with novocaine for the opening and exploration of the abdomen, followed by light ether anaesthesia, if necessary, for the removal of the gall bladder.

3—A short operation with little injury to tissue is essential in all operations on diabetics. Cholecystostomy is often not only justifiable but necessary. Cholecystectomy may be considered the operation of choice in those cases in which the gall bladder can be removed without too great damage to the liver and surrounding organs and when it can be done without prolonging the operation unduly.

4—Success in operating upon diabetic patients is dependent upon the following factors: (1) Comprehensive coöperation between surgeon and internist; (2) careful pre-operative study and preparation; (3) judicious selection of the anaesthetic and of the type of operation; (4) vigilant post-operative care; and (5) insulin.

5—Detailed instructions are given for the preoperative and post-operative care of diabetics who have been operated upon for gall stones.

TABLE II

COMPARISON OF RELATIVE REACTIONS TO ETHER AND GAS OXYGEN ANESTHESIA*

(Patient S. R. M. had cholecystectomy under ether and returned later with a stone in the common duct which was removed under gas and oxygen and 45 c.c. ether.)

	Diacetic Acid in Urine		Sugar in Urine	
	Ether	G. & O.	Ether	G. & O.
Day before operation	0	0	0	4
Day of operation	plus	sl. plus	35	1
1st day post-operative	+++	plus	105	15
2nd " "	+++	0	110	43
3rd " "	++	0	104	25
4th " "	sl. plus		71	
5th " "	0		55	
9th " "	0	0	0	0

*From data reported by Joslin, p. 623, third edition.

TABLE III

TABLE OF AVERAGES COMPILED FROM CASES REPORTED—THE PARALLEL COURSE WITH AND WITHOUT INSULIN IS MARKED

				Average days in hospital		Average weight	
	Average Age at Operation	Male	Female	Before Op.	After Op.	Before Op.	After Op.
Before Insulin	51	2	3	6	29	143	133
After Insulin	51	1	7	6	29	134	131

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4, 5 Joslin: Treatment of Diabetes Mellitus, 1923, p. 478, 479.
6 Personal communication.
7 Fitz: American Journal of Surgery, 1922, p. 36, 46.
8 Sansum and Woodyat: Journal of Biological Chemistry, 1915, 21-1.
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10 Joslin: Treatment of Diabetes Mellitus, 1923, p. 621.
11 Adams and Wilder: Wisconsin Medical Journal, 1924, 22-557.

DISCUSSION

Dr. F. Gorham Brigham, Boston: Dr. McKittrick in the paper he has just read has gone over so carefully the many points I am going to speak along a different line. First in regard to the treatment—As Dr. McKittrick has said, if the case is an emergency, a surgical emergency, there is no need of delaying for preparation or getting the patient sugar free because now with insulin any type of case can be handled satisfactorily during or right after the operation whether it is an emergency or not.

The point he made about doing routine cultures in these septic cases is a point all should remember because it is a comfort to the surgeon as well as to the family if a positive culture has been made and the patient dies afterwards. With a positive blood culture the outlook is bad.

If patients can be prepared for operation, it is better to do so in the interval cases if they are in good condition; and if they can be gotten sugar free with diet and insulin, it is better to do so; but, on the other hand, with insulin you can go ahead as far as their condition goes, whether they have acid or sugar or not.

Now with regard to the further treatment both before and afterward. As far as the dietetic treatment and insulin go, there is no type of case where you have got to be on the job every minute as in the diabetic. It isn't a case of laying out a plan and having it carried out for hours at a time. You have got to see your patients and have them supervised every minute from the time the operation is started until the patient is out of danger.

One of the most valuable helps that we have in handling this type of case, the dietetic part of it, is the single specimen test which has been perfected at the Hospital; and now following operation every patient has every single specimen of urine tested. If sugar comes in large amounts, or acid develops rapidly, a test being made every 4 hours, you can anticipate it and avoid the coma and other untoward symptom with insulin, whereas you couldn't if you didn't do this single test. In fact we do single specimens, the patient being catheterized if necessary. By following out this method these cases and especially these gallbladder cases can be handled satisfactorily.

Now there are a few points about diagnosis in these gallbladder cases that I would like to refer to. It has been our custom to group cases as into the obese, the acute gallbladder case, and the miscellaneous cases—the pregnant, and all that; then there is a fourth group which represents between five and ten percent. You notice that Dr. Joslin gave about 23 percent of cases which have been diagnosed as gallstone cases and proven so at operation. There are about five to ten percent of cases in diabetes which are called atypical diabetics. They are well at times on diet; and then on the same treatment (by diet) they don't do well. They are atypical; they do not react as the severe diabetics do.

They usually hold their weight and do their work and have no symptoms. The only trouble is that when they are subjected to infection, they get into serious difficulties; and if their diabetes isn't controlled, they get into the difficulties which come late in diabetic life with complications; in other words, they don't die but they become invalids and cripples. Now it is this five to ten percent of miscellaneous diabetics on whom we should make every effort to make the diagnosis of gallbladder disease. As Dr. McKittrick has shown, there is sometimes nothing which points to gross pathology in the pancreas. Special methods of diagnosis, as the duodenal examination, haven't given us satisfactory data by which we could make a satisfactory diagnosis. But if, on the other hand, in these atypical diabetics you go over their histories very carefully and go back for years, you may be able to bring out a series of digestive symptoms which would put you on the right track. The x-ray may help. But you have to study your case carefully and get all the information you can. With the surgery of today and with the use of insulin the time is at hand when with operation in these atypical cases we shall get better results.

The reason I say surgery ought to be done and done early in these atypical cases is because of the end results, the complications, such as retinitis, and gangrene, are very common; and in fact our Clinic has changed from treating diabetes into treating diabetes with complications. In fact, as was said, the patients do not die but get these difficulties; so if you can remove the cause and get out the gallbladder, do so. As time goes on and we follow these cases, it is striking how well the patients that are diagnosed early do, compared with those who have had the trouble for a long time. We have had four diabetics whom I have followed for eight years who had their gallbladders out. They were atypical cases and had chronic trouble; and as far as I can see, the diabetes has been in no way changed. On the other hand, the mild cases have gone along much better and haven't had these ups and downs. ~~If we~~ can only get some method by which we can make diagnoses earlier, we can get better results.

Referring to the classification again, if in all the diabetics you see, you will try to group them and classify them, you will find this gallbladder group comes into an atypical group but one which responds to treatment whether with insulin or not. With disturbances of digestion their diabetes flares up.

In closing I would like to refer to one striking case which brings out the point we are trying to prove. This case, a young man, 26 years old, an engineer, came to us six months ago after having been told that he had diabetes. He had been turned down for life insurance because, as he said, he had been told he had about two percent of sugar. When he came to us he had no sugar in the urine and had a normal blood sugar. We did a tolerance test, and his curve was absolutely flat, and he had no sugar in his urine specimen each hour. In his digestive history a typical history of gallstones was brought out. He had attacks of indigestion with jaundice. He went along last summer, and we checked up his blood figures. On one occasion he came in with digestive discomfort, heartburn and some distress and colic. He had a blood sugar of 18. Last fall he came into the Deaconess Hospital sugar free and was operated upon by Dr. Jones. A gallbladder full of stones was found with no adhesions—nothing to suggest a chronic condition. Following operation he had no insulin and just the proper amount of carbohydrates, but the striking thing was that after operation his blood sugar went up, and sugar came into his urine, up to two percent. He wasn't sick; he had no acidosis. Then as he lost his discomfort after operation, his symptoms subsided, and he convalesced; his blood sugar went down to a normal figure and he has had no sugar in the urine since. His digestive symptoms have gone, but the thing we refer to showing that he is a potential diabetic is that he came in with a septic wound and he then had a blood sugar up to 18 again; but we have had data on him since, and he has not had a lowered tolerance. His case is only one which shows the importance of getting these patients early before they become true mild diabetics. He is really a potential diabetic and should be treated, but he shows as a striking case of the type we have been discussing this morning.

Dr. David Cheever, Boston: I didn't hear the first part of the report from the Deaconess Hospital. I can only substantiate in a general way from my experience at the Brigham Hospital the report made by Dr. McKittrick. But there are one or two matters which I would like to take up and voice a slight difference of opinion. In the first place, we do attach a great deal of importance to getting the patient sugar free, if possible. That doesn't mean that in the presence of infection that should be waited for; but if the patient can be made sugar free with or without insulin, it is best to do so. Unless it can be done easily, we use insulin because it enables us to build up the tolerance and gives us a better margin of safety.

I think the last chart Dr. McKittrick showed is very striking, but it didn't tell the whole story; that is, the chart shows that the number of days in the hospital before and after using insulin was exactly the same, and indicates no essential difference in results, but, of course, the patient's loss of weight is an important consideration; and I believe that with the use of insulin the patient can leave the hospital in better condition.

Dr. McKittrick said incidentally that cholecystectomy is always done because, as he said, it was the wisest procedure. There is a feeling that cholecystectomy is done too freely and that often cholecystostomy would be wiser but I feel that cholecystectomy is the operation of choice when it can be done with reasonable safety. I think we have never seen—and Dr. Jones can substantiate this—we have never seen any symptom which can be ascribed to the fact alone that the patient had been deprived of the gallbladder. Yesterday we operated upon a patient who was operated upon twenty years ago by Dr. Maurice Richardson who did a cholecystostomy, and now there is a recurrence of stone after those many years; and these secondary operations are a not uncommon experience in the Brigham Hospital.

Now a word about anesthesia—I was surprised with what Dr. McKittrick said about gas-oxygen and about having, as a routine, adopted the practice of starting under novocaine first and then using ether in the more drastic part of the operation. My experience is that when you have to start the ether with the wound open it often isn't possible to avoid a stormy induction stage and it may take a long while. I realize that there is a great difference throughout the country at large in the satisfaction that surgeons experience with the use of gas-oxygen. I don't know how to account for it. I can't believe it is given less skillfully at the Deaconess Hospital. But our experience is more favorable than Dr. McKittrick's. I received a reprint from Dr. Baldwin of Columbus, Ohio, who has a prejudice against gas-oxygen and he cites numerous deaths in Columbus; and his opinion is that many deaths occur which are not reported. Our feeling is that it is the safest anesthetic in skilled hands; and I think I am right in saying that we have never had a death under gas-oxygen in the eleven years we have been using it. Our practice in these cases is to start with gas-oxygen, using at the same time novocaine, and occasionally, if necessary, preferring to add a few drops of ether during the critical part of the anesthesia than to carry out the plan proposed by Dr. McKittrick.

After all we are giving our personal experience. I do not think that I have had so great difficulty in closing the abdominal wall under gas-oxygen.

In a general way our feeling about the surgery of diabetics is that enunciated by Dr. McKittrick, namely that it is now put into the class of safe surgery with proper care beforehand. And I can only emphasize the necessity of proper coöperation between the surgeon and the internist. It is almost impossible for the surgeon to familiarize himself with the details and care of the diabetic patient from the point of view of his diabetes. The diabetic part of the treatment should be supervised by the internist.

Dr. P. P. Johnson, Beverly: Don't those few drops of ether indicate that you don't get relaxation with your gas-oxygen?

Dr. Cheever: Quite so. One doesn't get relaxation, and the point is this: that after all, the amount of ether is the important thing, and if you start with novocaine and get to the point during the operation where you have to stop and induce ether narcosis I should suppose more ether would be used than if you started with gas-oxygen and then used ether because there would be no induction stage. The amount of ether used during those few minutes when it is necessary to help out gas-oxygen is very small.

Dr. E. L. Hunt, Worcester: I would like to say a brief word regarding my experience with gas-oxygen anesthesia. The selection of the case is an important matter. I have had unsatisfactory results with the big, robust, plethoric individual. Gas-oxygen is no anesthetic for a fight. So if you eliminate a group of cases which go under anesthesia badly, and if you carry out the precaution of having the patient rest in the hospital before the operation and with the careful local use of novocaine, being as careful as you would if you intended to operate without a general anesthetic, I think you will find gas-oxygen to be a mighty fine and safe method—gas-oxygen in combination with novocaine.

Dr. L. S. McKittrick (closing): We, too, use novocaine with gas-oxygen. It was one of Dr. Brigham's patients that caused us to change. His breathing was so deep and expirations so forced that it was with considerable difficulty that the duct and artery were clamped. It then happened that the clamp slipped off the cystic artery and the dangers of catching it again with a poorly relaxed patient seemed too great. We therefore have omitted the gas-oxygen and used ether at this stage instead. We have had the struggling on the table, but it hasn't bothered us. We use a small amount of ether and take it off in five minutes, and it has worked very well.

ANKYLOSIS: TREATMENT BY ARTHROPLASTY

BY W. RUSSELL MACAUSLAND, M. D.

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The term ankylosis should be limited to include only those joints which have lost at least ninety per cent of their normal motion.

Types. Ankylosis may be fibrous or bony in character. In the fibrous type in which the bone ends are not in close apposition, ten or even fifteen degrees of motion may be possible. Generally, however, the motion in such joints shuts down slowly until only two to three degrees are permitted. The symptoms in these cases arise from strain to which such a joint is very susceptible.

In bony ankylosis in which there is firm union of the bone ends, no motion remains. As these joints are fixed, there are no signs of local strain, and many joints ankylosed in good position are entirely satisfactory, providing the associated lesions in the tendons, muscles or other extra-articular structures are not excessive. If, however, the position of the ankylosed joint is not good, symptoms develop from the deformity, and from the excessive strain upon the neighboring joints.

Causes. The most frequent causes of ankylosis are *traumatic injuries* of the joint or periarticular structures, and *disease*. Occasionally a case of ankylosis of congenital origin may be seen, but the writer has never dealt with this condition by operation.

Ankylosis of traumatic origin is usually due to a fracture dislocation with wide separation of the fragments, which is followed by the formation of excessive callus. At first the callus interferes mechanically with motion; later, ankylosis, usually of firm fibrous formation, results.

The infectious process producing ankylosis may be either acute or chronic. In the former case the onset of the infection is sudden and the course severe, ending usually in a bony ankylosis. The slow, insidious, polyarthritic, infectious process is generally found associated with joint ankylosis. The infectious element may be hemolytic or it may be the result of sepsis introduced directly into the joint, or extended into it from a nearby disease. The infection in such cases may persist for years hidden, and flare up when disturbed by operative procedures. Ankylosis results from the formation of adhesions both within and without the joint and is, at least at first, fibrous in character.

Care should be taken to differentiate the type of ankylosis which is due entirely to periarticular lesions, as frequently non-operative procedures may benefit such cases.

Pathology. The pathological changes in the tissues depend upon three factors; the virulence of the infection, the immunity and resistance of the patient, and the retention of the infection in the tissue in or around the joint.

In cases of acute arthritis there is oedema in the periarticular structures from extension of sepsis, or septic wounds. The synovial membrane in which the microörganisms first locate, becomes thickened and its serous surface is destroyed. In extreme erosions subserous tissues bridge over the spaces between the serous erosions and adhesions result. The gonococcus, pneumococcus, and streptococcus are most frequently found in such cases. The tissues become thick and porky and there may be oedema of the subserous surfaces. Later, fluid is extravasated into the joint proper. In some cases this fluid may disappear, leaving no aftermath. With repeated infections, however, or in severe attacks, the fluid becomes cloudy. Then the ligaments become infiltrated, and the capsule becomes markedly thickened. The process of repair is one of absorption and cicatrization. Adhesions may form in the tendons, tendon sheaths, and capsule. The joint cavity may become obliterated and osseous union of the bone ends may take place. In subacute and chronic cases, erosions are not so common. Villi form over the synovial membrane and become covered with serous membrane. Pannus formations creep down from the membrane, and the joint cartilage becomes thinned. Later pin-point erosions occur which, in the process of repair, are bridged over by fibrous tissue. This tissue may unite with that on the opposing end and ankylosis result. If infection continues and all cartilage on the opposing surface is destroyed, bony union results.

TREATMENT

Until very recent years the best treatment of ankylosis dealt almost entirely with the proper positions in which joints should be placed during disease or traumatism, so as to obtain the best function in case ankylosis should occur. The knee stiff in almost full extension is certainly far less of a disability than if fixed in marked flexion. The elbow joint when stiff at or near a right angle usually permits satisfactory function. The hip ankylosed in ten degrees of abduction, slight flexion (ten degrees), and slight external rotation, permits a certain amount of function. A shoulder stiff in abduction is better functionally than the shoulder stiff at the side of the body. The wrist stiff in hyperextension is usually satisfactory.

With the development of surgical technique, the inconvenience of a stiff joint has become a stimulus to all surgeons to obtain, if not perfect function, at least sufficient for the necessities of life. Arthroplasty is the method that has supplanted all others in the attempt to mobilize joints.

In general, the following joints may be considered for arthroplastic procedures: (1) the elbow, (2) the hip, (3) the knee, (4) the temporomaxillary (jaw), and (5) the wrist and fingers. Other joints are excluded from the list for the reason that, if ankylosed in good position, they will give good function.

Certain definite factors must be taken into consideration before advising arthroplastic measures for the mobilization of any joint. The disability of the patient is of first importance, for a stiff member that is of great disability to one patient, may be of only slight discomfort to another.

No attempt should be made to mobilize a joint until epiphyseal growth has ceased. If an operation is performed earlier, it is impossible to remove sufficient bone to secure good motion, without grave danger of injury to the epiphyseal line. Ankylosis is certain to result.

The cause of ankylosis must be determined. Arthroplasty gives the best results in joints ankylosed from purely traumatic lesions. Infections, however, do not constitute a contra-indication, provided the process has not been tuberculous or is not active. Sufficient time should be allowed for the entire eradication of the infectious process. A tuberculous joint, even when ankylosed firmly, may retain small walled-off foci throughout life and, therefore, except in rare cases, should be considered a direct contra-indication to any mobilizing.

If a deformity is present, of sufficient extent to warrant correction, this should be done before arthroplasty is attempted. For instance, the hip ankylosed in marked flexion and adduction will present a very difficult operative problem, unless the deformity is corrected by a preliminary procedure.

The fundamental indications for arthroplasty may be sumarized as follows:

Major joints

1. Two stiff hips indicate operation on one joint or possibly both.
2. Two stiff elbows present the same indication.
3. Two stiff knees are a definite indication for arthroplasty on one side, at least.
4. A combination of ankylosed hips and knees in the same individual, a condition not infrequently seen in multiple arthritis, is a very definite indication for attempting to mobilize one or more joints.

Minor joints

Among the lesser joints which may properly be considered subjects for intervention are:

1. Stiff shoulders.
2. Stiff fingers.
3. Stiff wrists—very rarely.
4. Stiff maxillary joints—which require arthroplasty.

The general operative technique of arthroplasty consists of: (1) the exposing of region of the joint surfaces, (2) the modeling of the bone-ends in accordance with mechanical needs, and (3) the interposition of a substance to prevent bony union. The arthroplastic measures in use today, as outlined by Murphy, Payr, Baer, and Allison and Brooks, differ in the substance interposed. The writer has found that free fascia transplants give excellent results.

Elbow. Ankylosis of the elbow is probably more objectionable than ankylosis of any other joint. In the case of the elbow there is no position in which ankylosis does not interfere with function. Usually ankylosis occurs in extension of about one hundred sixty degrees, in which position the arm, although not unsightly, is awkward.

For many years the writer has been working to improve the method of procedure in arthroplasty of the elbow. Finally a true arthroplasty has been evolved which results in a smoothly gliding joint, an excellent range of painless motion, and normal joint strength and stability. Such a prognosis is of course dependent upon the favorable indications already outlined. I wish to emphasize particularly the necessity of proper selection of the case, careful preparation for operation, strict adherence to the technique of operation, and proper after-care.

OPERATIVE TECHNIQUE—WRITER'S METHOD

In operation, the arm from the wrist to the shoulder, and the leg on the same side from the hip to the knee, are given a two-day preparation. At the time of the operation, a tourniquet is applied to the upper third of the arm and an application of iodine made to the skin.

A semicircular incision is then made, beginning over the external condyle, running down about two inches, and then extending up over the internal condyle. The wound is sponged with alcohol and carefully clamped off to avoid handling the skin during the operation. The flap containing skin and superficial fascia is then dissected back to the base line and retracted. The ulnar nerve is isolated and dissected out of its sheath. It is sometimes difficult to find this nerve, but it is always to be sought at the inner side of the internal condyle. It should be dissected out carefully with a blunt dissector so as not to injure it. After it has been freed for one and one-half inches, gauze is passed beneath the nerve, and it is retracted to the ulnar side. It is then freed further by blunt dissection with gauze.

A transverse incision is then made, extending down through the periosteum. This incision follows in direction the superficial one, and outlines a flap which is to be dissected back and preserved *in toto* for subsequent covering for the joint. The pulling back of this flap is a hard and tedious process until it is well started, after which it can be peeled back readily by blunt dissection. It is the inner side that is the hard part, as the layer is thin here, and one must exercise great care not to buttonhole it. The olecranon is than sawed through. Frequently it is now possible to break open the old joint. In difficult cases in which the ankylosis is bony and the joint cavity obliterated, it is necessary to saw through the joint. The tip of the olecranon has to be chiseled out and dissected back with its posterior flap. Usually the olecranon is too large, and it is well to take off a little of it. The capsule, fascia, and ligaments are then dissected back so as to allow the lower end of the humerus to protrude into the wound. Then its edges are snipped off with rongeur forceps and a new trochlear or intercondylar surface formed. A shoe maker's rasp is used in filing the extremity as near like the normal humeral end as possible. After this modeling, a piece of bone is removed corresponding to the olecranon fossa in the normal humerus. One has to be careful about making this cup. The modeling is largely done with a saw and a file.

To ensure good function, the joint surfaces should fit accurately before the fascia is applied, but, on the other hand, the joint should not be too loose. Only sufficient bone must be removed to give free motion. If too much of the bone is removed, a flail joint will result, giving the operation no advantage over an excision. When this mortising has been completed, the fascial flap, five to seven inches long by four to five inches wide, is dissected from the leg through an incision made on the outer side of the thigh, a little below the middle. The thigh wound is then closed.

The fascia, which is free from all fat, is placed about the newly fashioned humeral condyles and attached anteriorly to the capsule and posteriorly to the periosteum of the lower end of the shaft of the humerus with interrupted chromic catgut sutures No. 2. Chromic catgut No. 2 is then loosely wound twice around the shaft just below the interrupted suture line.

The forearm is placed in apposition to the condyles. Two drill holes are then made in the olecranon process and two others opposite them in the shaft of the ulna. Through these holes kangaroo tendon is passed and tied. The inner layer is now sutured with chromic catgut No. 2 and the skin and fascia sutured with plain catgut No. 2. Dry sterile dressings are applied and the arm put up in plaster beyond a right angle.

After-treatment. If there is no evidence of infection the cast should remain on for a week. It is then split and the dressing changed. If there is a persistent temperature, a window should be cut in the cast and the wound inspected.

If normal healing has taken place, passive motions are begun in about ten days. The arm is always kept above a right angle. After three weeks, gentle massage is applied. After six weeks, the arm is baked three or four times a week.

The ultimate success in these cases depends very largely on the after-treatment. The patients should be under observation for a long period of time. Frequent radiograms should be taken so that we may follow the bony changes in the joint. If motion begins to shut down, the arm should be manipulated under an anesthetic, and the elbow put up in acute flexion. Occasionally motion becomes limited, due to an exuberant growth of new bone. In this case, a secondary operation should be done to remove the new bone, but it should not be undertaken for at least three months after the original operation.

Case 1. I. H. had fallen on her elbow four months before she entered the hospital. She suffered considerably from pain, and was unable to use her arm. I manipulated her elbow under ether and repeated the manipulation in two weeks, without result. On account of the limitation in motion, an arthroplasty was advised. The elbow was slightly tender, somewhat enlarged, and the bones felt rough and irregular. The roentgenogram showed an old fracture of the lower end of the humerus.

June 23, 1915, an arthroplasty of the elbow joint, with the use of a fascial flap, was done. The patient made a good recovery.

July 3, 1915, the motion of the arm was very much increased.

June 1919, three years after the operation, the range of motion was from thirty-seven to one hundred twenty-five degrees.

Knee. In treating ankylosis of the knee joint, a distinction must be made between the type in which loss of motion is due to periarticular lesions and the type due to intra-articular pathology. It is possible to make such a decision from a study of the history of the case, from the physical examination, and from the radiographic findings.

In ankylosis of the knee joint due to intra-articular pathology, arthroplasty is often advisable. The knee joint, however, presents a greater barrier to arthroplastic work than any of the other large joints. The new joint must be satisfactory not only as to function, but it must be *absolutely adaptable* to *weight-bearing* that is free from pain and sensitiveness. Without this stability a flail joint results which necessitates the wearing of a brace to permit walking.

Arthroplastic measures, therefore, must be cautiously advised in the case of knee joint ankylosis. If a single ankylosis is in good position (five to eight degrees of flexion) arthroplasty should be attempted only after considerable thought, as such a joint is functional. In the presence of such complications as two stiff knees or a stiff knee and a stiff hip, a definite indication for operation on one knee at least is presented.

Operative technique. The first essential is absolute asepsis. The operation should be performed under thorough hematosis with the use of the Esmarch bandage and tourniquet. The usual preparation is given both legs from the ankle to the groin. I believe it is best to remove the fascia from the opposite leg, thereby minimizing the extent of the operation on the ankylosed leg, as well as making it possible to remove more fascia without disturbing the external support of the joint.

The incision is made from just below the inner attachment of the patellar tendon, curving slowly over this point to the middle of the external cartilage, and then directly up the outer side of the leg just above the mid-horizontal line, a distance of five to ten inches from the joint proper. As much fat as possible is taken with this incision. After clamping the skin-edges with towels, the flap that has been outlined, is dissected to the inner side of the leg, exposing the patellar tendon, patella and tibial tubercle.

A curved incision is then made through the fascia, beginning in the mid-anterior line about five inches above the patella, and running between the patella and outer condyle to just below the knee joint.

The quadriceps tendon is then exposed and elongated. This elongation not only allows better joint exposure, but affords a proper lengthening when we later place the leg in flexion in plaster. This lengthening may also be done by the Bennett Method. Some surgeons detach a piece of the tibial tubercle in order to increase the exposure, but I have found this procedure unnecessary when the quadriceps tendon is elongated in the beginning. There are also many difficulties when this piece of the tibia is removed, such as delayed or faulty union, which complicate and delay the convalescence.

Probably one of the most difficult problems to confront in arthroplasty of the knee is the treatment of the patella, as not infrequently motion and stability are obtained between the femur and tibia, but the patella reunites and the joint becomes stiff. To prevent the occurrence of such a condition, the following treatment of the patella has been developed. The patella is raised from the femur, taking with it the lower cut portion of the quadriceps tendon. It is then forcibly retracted to the inner side of the knee with the inner ligamentous attachments intact. With the femoral surfaces of the patella facing upward, an incision is made about the fascial attachments of the patella. The patella is then divided into three vertical sections, and the outer and inner thirds removed *in toto*. About one-third of the thickness of the middle third, or that part in closest apposition to the quadriceps and patellar tendon, is then removed, and all edges carefully smoothed. The capsule of the inner or outer surfaces which had been cut previously, is brought to the middle line and sutured by continuous suture over the remaining patella. Thus the patella is enclosed in its capsule.

Attention is now given to the freeing of the joint line, and to the formation and modeling of the new joint surfaces. The tibia is separated from the femur by means of a gouge, the diameter of which corresponds to that of the femoral condyle of the adult. First the external condylar mass is cut, then the internal, with the instrument inclined at such an angle that an approximate semicircular line is formed. As the operaton proceeds, an assistant flexes the knee so that the posterior bridge between the condyles is fractured.

With the same gouge, about one centimeter of bone is removed from the condylar surfaces. The tibial and femoral surfaces are then remodeled to conform as nearly as possible to the normal contour of the joints. Putti's instruments are excellent for this modeling. Two concavities carefully conforming to the shape of the condyles are then created in the tibia. In order to ensure stability, it is very important to leave a *well-defined spine* on the tibial surface, corresponding to a condylar notch. After the surfaces have been carefully modeled, the joint ends are brought together to make sure that sufficient bone has been removed. The surfaces must glide smoothly, and, if necessary, more bone may be removed. A space into which the patella will rest is cupped out of the upper surface of the femur. Files and rasps are used to smooth all surfaces. This filing, besides smoothing, drives a bone dust into the spongy parts, which aids in hemostasis as well as in roughening the surfaces of the sectioned edges to which the aponeurosis of the fascia transplant will closely adhere.

A large piece of fascia lata ample enough to cover both condyles is removed from the other leg. The fascia nearest the knee on the outer side is thickest and most serviceable. Sew this fascia over the condyles, covering well all exposed bone, and attach it three inches above the articular surface. The femur is then adjusted to the tibia, and the patella replaced. The outer capsule is united with interrupted chromic catgut.

The elongated quadriceps is strongly sutured and the skin closed with interrupted catgut. A plaster is applied from the toe to the groin with the knee in thirty-five to forty degrees of flexion, and the leg placed in an elevated position in bed. Opiates are often necessary and may be freely used.

AFTER-TREATMENT

The temperature, pulse, and pain are carefully watched for any signs of infection.

Traction should be applied shortly after the first week or ten days of convalescence. It should be so arranged that the traction is constant whether the leg is in a flexed or extended position. The intrinsic traction apparatus of White[1] has been found most satisfactory as a means for regulating traction and passive motions.

The traction is continued for at least three or four months. Then a jointed spica is applied and weight-bearing allowed.

Massage for the thigh and calf is usually started in five or six weeks after the operation. Active motion may be started by means of pulleys about the third or fourth week.

Case I. F. O'K., age 31. In 1909 this patient had an acute neisserian infection in the left knee. The opening of the joint resulted in ankylosis in good position, but there was no motion between the tibia and the femur nor between the patella and the femur. Manipulations were unsuccessful in obtaining motion. Arthroplasty was advised.

Dec. 14, 1910, an arthroplasty on the left knee was done according to the technique as described.

December 23, 1910, the patient was out of bed and having daily dressings.

January 5, 1911, the cast was removed and a posterior shell applied.

January 7, 1911, the patient had a small amount of weight-bearing and was using crutches.

January 10, 1911, the patient was discharged from the hospital. He was wearing a leglet with limited motion. Stretching and daily hot fomentations were to be continued.

January 3, 1923, twelve years after the arthroplasty, the patient wrote that the knee was no bother at all, and he could do everything. Sometimes he has to stop and think which is the knee operated upon. His leg is straight and he has good power in the quadriceps. Complete extension is possible and ninety-five degrees of motion in flexion. He has absolutely no lateral mobility.

END RESULTS

If the technique of operation is carried out with extreme care, the expectation of joint motion is extremely good. The new joint should have smooth motion seventy-five to ninety per cent normal, and the restricting capsule should be strong without tenderness and without the tendency to strain easily. The tendency for exostoses to form around a joint should be reduced to a minimum, and the joint should retain and even increase its motion on use.

Secondary operations for the removal of limiting spurs at all joints, and for the removal of the head of the radius in the case of the elbow joint, have given opportunity for the examination of the completed joint. The bone ends are smooth, fit snugly, and are covered with firm fibrous tissue and move with a minimum of resistance. The joint space is a sac sometimes multilocular and contains apparently normal joint fluid. With overuse the joint shows some tendency to strain, but in general it stands heavy work in a satisfactory manner. In one of my cases, for instance, both elbows were mobilized, and the result was so satisfactory that the man was able to return to his work as a wood chopper.

The retention of motion is a very important factor. My statistics show that good motion has been retained for over ten years in several cases, under the hardest usage, and this feature alone proves that the new joint is well able to last for a long period of years.

For details of the history of arthroplasty, as well as further details on the operative technique, the reader is referred to my article on ankylosis published in *Surgery, Gynecology and Obstetrics*, September, 1923.

REFERENCE

1 White: Boston M. and S. J., 1924, CXC, 742.

DISCUSSION

Dr. Nathaniel Allison, Boston: After seeing this demonstration of an operative technique, one hesitates to talk of this subject in any terms except those of unqualified praise. It is acknowledged generally that Dr. MacAusland has attained the best of results in a series of elbows operated upon for bony ankylosis. His cinematograph shows the accuracy and nicety of his operation on the elbow, and the satisfactory results that have followed the operation. In general, he has set forth some of the features of arthroplasty as a surgical procedure,—when it should be done, and when it should not be attempted. I feel, however, that after seeing the technique displayed on the screen in moving pictures, that the impression might be gained that arthroplasty is an easy operation and one that in a large percentage of cases gives successful results. I do not feel that this impression should be given of arthroplasty. Arthroplasty of the elbow, as Dr. MacAusland has demonstrated, will be successful in a fairly high percentage of cases. Arthroplasty at the hip will be successful in perhaps less than half of the cases operated upon. Arthroplasty at the knee will give a high percentage of failures.

In the motion picture which Dr. MacAusland has shown us of arthroplasties of the knee, it seemed to me that the case was not one of bony ankylosis at the knee. After the knee joint was opened, so admirably shown in the picture, it was not necessary, according to the picture, to remove a bony ankylosis. In the majority of cases where bony ankylosis exists at the knee, arthroplasty, if successful, is apt to supply the patient with an unstable, non-weight bearing articulation. Until we are in a position to supply some substance or structure that will simulate normal articular cartilage, which substance or structure may be interposed between the cut ends of the bone, arthroplasty will always be an operation of doubtful success. This observation is especially true when applied to the weight bearing joints such as the knee and the hip. The methods of arthroplasty advised by J. B. Murphy of Chicago, and Payr of Germany have been used by many operators for the last two decades, and it may be observed that little progress has been made in arthroplasty at the knee in this period of time. An occasional success is all that has been attained. Dr. MacAusland's elbows, however, show what may be accomplished with this joint when it has become ankylosed, and I wish to compliment him on his excellent series of elbow arthroplasties.

In the series of slides which I wish to show, the reasons for re-establishment of bony ankylosis after an attempt at arthroplasty is clearly set forth. After the ankylosis has been removed by surgery, the process set up by the tissues is directed immediately toward a re-establishment of an ankylosis. Fibrous tissue replaces the exudate which is poured out by the injured ends of the bone. This fibrous tissue does not become firm at once, and has led to an erroneous estimation of the re-establishment of joint motion. As time goes on, the fibrous material between the bone ends becomes firmer and firmer and is finally changed to bone, re-establishing ankylosis.

I do not feel that arthroplasty should be condemned as a surgical procedure. On the contrary, I feel that in the future, some successful method of arthroplasty will be devised, and this will depend upon the use of some procedure which will give to the new made joint something resembling hyaline articular cartilage covering the cut ends of the bones. I do not believe that arthroplasty should be represented as an easy or uniformly successful surgical procedure.

Dr. MacAusland, closing: I know of no one whose constructive criticism I appreciate more than Dr. Allison's. I have already said that in our early work we had a sea of failures and I think that is sufficient. I do not agree with Dr. Allison in reference to knee joint arthroplasties. I am perfectly sure a single stiff knee is a good functional joint when in proper position, but when we have two stiff knees and hips, and other combinations of ankylosis, it is necessary to try something. We have been doing that and we can show a great many patients with decided improvement in function. I am convinced that if we can do a stable arthroplasty on the elbow, with no lateral mobility, we can do it on the knee; and it depends on careful technique. One of the greatest objections to knee joint arthroplasties is instability, and that instability has been due to improper modelling and after-care. I believe the introduction of free fascia as an interposition membrane prevents the closely modelled surfaces from re-uniting as has repeatedly been demonstrated in our work on ankylosed hips, knees, and elbows.

INTESTINAL OBSTRUCTION BY MECKEL'S DIVERTICULUM—WITH A REPORT OF SIX CASES

BY ERNEST L. HUNT, M. D., WORCESTER, MASS.

FAILURE of the yolk-sac to close and disappear in the normal manner during the first six weeks of fetal life may result in a variety of anomalous structures with a variety of pathology corresponding to the degree of the failure. This may be complete, leaving an opening in the abdominal wall and anterior intestinal wall through which the mucosa of the posterior intestinal wall pouts and the liquid feces discharge—the so-called anus-preter-naturalis of the early anatomists. Through the opening the gut may evert with prolapse of a considerable portion as in a case recently reported by Dr. Cutler[11] of Boston or through the frail marginal attachment other coils may herniate.

Rather than this wide defect the closure may be arrested with the formation of a tubular offshoot of the gut opening at the navel. This tube may dwindle to a tiny sinus. It may close within to leave mucous membrane "rests" in the navel from which future pathology arises; or close at the bowel to leave a cyst or the inner closure may be complete and the connection between the tube and navel disappear, or it may persist as a fibrous cord connecting the navel to a pouch-like protuberance from the gut. The cord may disappear leaving only the pouch or the pouch may practically disappear leaving a string to float with one end loose in the peritoneum. In the formation of these strings the fetal omphalomesenteric vessels may be concerned so that besides the string from the pouch to the region of the navel, the distal attachment may reach other points of the abdominal wall or may form a band or loop from the pouch to the root of the mesentery or become detached at one end or the other.

When the pouch persists it is known as Meckel's diverticulum after John Frederich Meckel[1] who in 1809 gave the best though not the first description of the structure, and to him belongs the credit of reasoning out its origin and recognizing its clinical importance.

The pouch is made up of all the layers of the normal intestinal wall and is thus distinguished from the acquired diverticula which are herniations of the mucosa through defects in the muscle layers.

These pouches may vary greatly in length, size, shape and position, the last depending upon the rate of growth of the various segments of the gut. In the great majority of cases it is between three and four feet from the ileo-cecal valve, springing from the anti-mesenteric side of the gut, having a communication with the gut equal to the size of the lumen at that point. Its summit is usually free but may have connections as above described. It may be long and tubular or short and stubby. Its connections with the bowel may be wide or narrow. It is subject to the usual pathology of the small intestine and contributes further pathology because of its own peculiarities.

The following outline presents its clinico-pathological possibilities, illustrations of each item in which can be furnished from the literature with the obstructive, inflammatory and foreign body events by far the most common. Of the obstructive episodes cords and bands, intussusception and volvulus occur most frequently and in the order named.

CLASSIFICATION ACCORDING TO CLINICAL PATHOLOGY

Obstructive Types
(Ileus)

Bands, cords, terminal filaments, adhesions, inversion, volvulus, intussusception.

Inflammatory Types

Simple diverticulitis (may be associated with appendicitis).

Ulceration (may be perforated): Septic, typhoid, tuberculosis, foreign bodies.

Hernia

Simple, incarcerated, strangulated.

Open Types

Umbilical fistulae. Prolapse of bowel through open fistulae.

New Growths

Sarcoma,—carcinoma,—myoma,—polyps.

Unusual Anomalies

Mucosa having gastric epithelium.

INCIDENCE

(1) As to occurrence.

The commonly accepted figure of the relation between individuals possessed of a diverticulum to those without is 1 to 50. These estimates are based upon figures from post-mortem findings but Balfour[2] finds in the records of 10,600 laparotomies at the Mayo Clinic but 15 instances wherein such a structure was noticed. In upwards of 1000 autopsies I personally recall but three instances and incline to think 1 to 200 the more probable figure. Males are shown to be affected 3 times to females one.

(2) As to its importance in the causation of abdominal crises.

A. E. Halstead[3], writing in 1902, accepted 6% as the probable proportion basing his opinion upon the figures of several earlier writers quoted by Fritz[4] and to which the latter did not attach great importance. The figures were all collected prior to 1876 and are hardly representative of modern conditions. E. P. Richardson[5] in 1920 reviewed the cases of intestinal obstruction for the previous decade at the Massachusetts General Hospital and found 118 cases in 4 of which Meckel's diverticulum was the cause—a percentage a trifle over 3.

Since the enormous increase in abdominal surgery has added a new element in the causation of intestinal obstruction in the shape of post-operative adhesions estimated by Finney[5] in 1920 as responsible for 50% of all cases, the relative importance of these congenital structures must have shrunk proportionately.

(3) As to the relative incidence of the different types of pathology.

The following table arranged from Wellington's compilation of 326 cases, chiefly from the literature prior to 1913, will show approximately the proportion in which the various phases of diverticulum pathology occur. It is to be understood that the arranging of statistical groups is more or less arbitrary and that some cases classed as obstructive may have originated from an inflammatory process and vice-versa. The mortality rates are especially noteworthy and cannot fail to impress one with the seriousness of the affections of this appendage. Figures from other writers prior to this period are similar or worse. Thus Miles Porter in 1905 from 184 collected cases gives the total mortality as 60% and the mortality of operated cases as 50%. Halstead quotes Berard and Delore as having 32 cases with a mortality of 72.3%.

During the six months from Oct. to March six clinical cases have come under my observation, four of which were obstructive in the true sense

RELATIVE INCIDENCE OF THE DIFFERENT TYPES OF PATHOLOGY OF MECKEL'S DIVERTICULUM

TABULATION OF WELLINGTON'S ANALYSIS OF 326 CLINICAL CASES

Type of Lesion	No.	%	Not Op'd	Deaths	Op'd	Deaths	Mortality %
Intestinal obstruction, mostly by cords	144	44.2	28	28	108[b]	50	49
Intussusception	59	18.0	14	9[a]	44	24	54
Volvulus	9	2.7			8		50
Diverticulitis (ac.)	50	15.2					40
Foreign bodies included	15						
Umbilical fistulae	21	7.3			16	1	6
Prolapse of bowel	3						
In hernias	27	8.6					
Perforation by Trauma	2	4.0					
Perforation by Typhoid	6						
Perforation by Ulcer	1						
Pelvic Tumor	1						
Cyst	1						
Total	326	100					

[a] Result not given, 4 cases.
[b] Result not given, 6 cases.
Mortality for 3 obstructed groups operated, 51%.

of the word and two were incidental to appendicitis but as the latter were instructive examples I include them in the reports.

I am much indebted to my colleagues on the Worcester City Hospital staff and to Dr. Abbott of Clinton for the privilege of reporting their cases.

During this same period a seventh diverticulum was encountered in one of my medico-legal autopsies.

Case No. 1 (by courtesy of Dr. Wm. E. Denning, Worcester City Hospital).

A. K., A-36290. F. S., age 20. Admitted Oct. 22. Discharged Nov. 21. Condition, convalescent.

Diagnosis: Appendicitis, chronic. Meckel's Diverticulum. Wound Infection.

Chief Complaint: Occasional sharp pain low in rt. lower quadrant for four months.

Present Illness: Was well until one year and a half ago, when she developed "indigestion" which has steadily increased. Always had a "weak stomach." Has had pyrosis, belching of gas and some nausea but no vomiting, always constipated requiring catharsis. No bloody, tarry, or clay-colored stools; no jaundice. No hematemesis. Wt. constant, about 115-120 lbs.

Every afternoon from about 12 to 4 has backache and headache, no matter what she is doing. Has not had a day free from headache for over a year. Headache is between eyes and patient has never had eyes examined. Backache is coccygeal—stopped wearing corsets about one year ago on account of abdominal distress.

Has considerable epigastric distress for about one year, with pain about heart—not related to working or time of day. Is always hungry and then pain is worse and is relieved for a few minutes by eating. Has been on a "bread and milk" diet for four months, with a little meat.

For four months has had considerable pain in right lower quadrant with two exacerbations of sharp pain, three weeks and one week ago, lasting about one hour. No nausea or vomiting at these attacks, but obstipation. Pain is a dull ache, coming on late in afternoon, accompanied by backache (as above), radiates only down right leg.

P. H.: Exanthemata of childhood. Influenza in 1918. No other illnesses. No operations or injuries.

Cta.: Began at 14 yrs., regular every twenty-six days for 4-5 days with some pain. For past 4-5 months has had great pain for first 2 days, making her stay abed and writhe in pain. Has had considerable leukorrhea for one year. Last period Sept. 27.

F. H.: Father and mother, five sisters and one brother living and well. No deaths. No cancer, tuberculosis or insanity. One sister had an illness like the patient's three years ago and was operated for appendicitis at Memorial Hospital. Patient single.

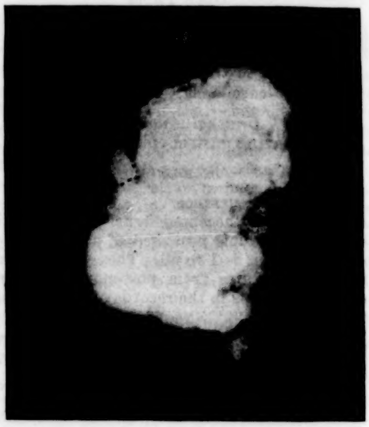
Occupation: Light work at home.

Physical Examination: Irrelevant except local.

Admission Note: Oct. 22. Arrived in good general condition. At present no pain. Temp. 98.8°, pulse 122, resp. 20, w.b.c. 10,000.

Local: Abdomen slightly and symmetrically distended and dull to percussion. No masses or spasm. There is local tenderness just mesial to McBurney's point and deep in right groin, more severe at the latter place. No viscera palpable.

Progress: Under observation up to Oct. 30. Urine and blood normal except for slight anemia. Gastro-intestinal x-ray study reported "No pathology in stomach or duodenum. Appendix shows 24° residue." General physical signs as above.



Roentgenogram of Case 1, showing barium-filled diverticulum.

Operation: Oct. 30, 1923. By Dr. Denning. Ether.

Pre-operative diagnosis: Appendicitis, chr. Salpingitis, rt.?

Median incision above pubes, exploring with hand found small uterus, right tube injected, appendix brought into view which was swollen and injected, meso appendix tied off and cut. Appendix clamped, tied, removed, stump cauterized and buried in the meso appendix. In packing off small intestine, diverticulum appeared. Intestines clamped, diverticulum cut off, intestine brought together with cont. No. 0 chr. c. g. in two layers. Cigarette drain placed over same. Abdomen closed, peritoneum with pl. fascia with chr. skin with s.w.g.

Post-operative diagnosis: Appendicitis, chronic with diverticulum of ileum.

Operation by name: Appendectomy; diverticulectomy.

Convalescence uneventful except for superficial wound sepsis.

Case No. 2. (Courtesy of Dr. F. L. Magune, Worcester City Hospital.)

C. J. F. A-39355. M., 57, m. Wire worker. Admitted Apr. 4, 1924. Died April 8, 1924.

Diagnosis: Appendicitis, acute. Diverticulitis, acute.

History: Three days ago while at work was taken with severe and persistent pain in epigastrium compelling him to quit work. Vomited and has been unable to retain any nourishment since. On the second day the pain settled into right lower quadrant and right flank. Constipation marked, not relieved by cathartics. He has had headache, malaise, prostration and chilliness.

Has had scarlet fever at age of 24 and several traumatisms, losing left eye in 1895. Average weight 205 lbs. Generally healthy and active.

Physical Examination: Lips somewhat cyanotic, heart negative, lungs negative save for harsh breath sounds in rt. axilla. P. 108, T. 102, R. 24.

Abdomen: Definitely tender over right lower quadrant, most marked over an area 2″ inside right anterior superior spine. Generally tympanitic. No masses or spasm felt. White count 12,800, urine s. p. tr. alb.

After 12 hours observation abdominal signs persist and operation decided upon.

Operation, April 5: Rt. rectus incision, encountered diverticulum of small gut 1½″ deep by 1¼″ in diameter having thin and discolored tip. Appendix found enlarged and injected, adherent to cecum by fibrinous exudate. This was removed then the diverticulum was inverted and stump closed over. Wound closed with drainage.

April 6: Hiccoughed occasionally since operation. General condition fair. Slight drop in temperature.

April 7: Temperature subnormal, moderate distention.

April 8: Distention increased. Skin cold and moist, wick withdrawn, no pus. Temp. still subnormal.

April 9: Temperature rose to 107° with delirium, rales in rt. apex. Expired at 11:40 A. M.

Case No. 3. (Courtesy of Dr. G. H. Hill, Worcester City Hospital.)

J. S., m. s., age 11.

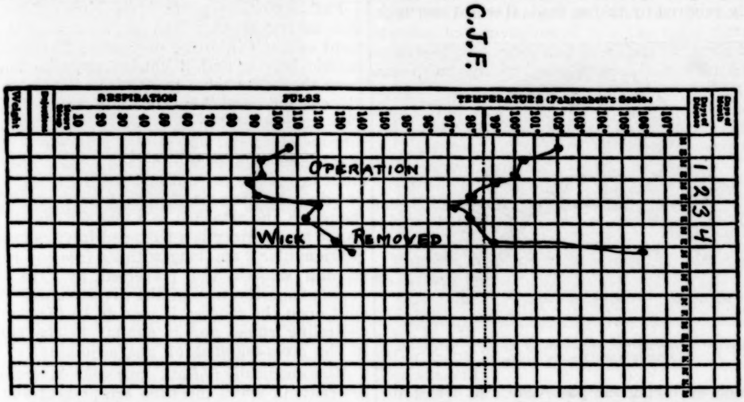
Admitted Oct. 20, 1923. Discharged Oct. 30, 1923. Convalescent.

Diagnosis: Intestinal Obstruction by Meckel's Diverticulum. Appendicitis, chronic.

History: Two attacks similar to present in 1916 and 1922—well between attacks except for an occasional "stomach-ache" on getting up in the morning, appetite good. Yesterday afternoon began to vomit which was followed by severe sharp pain in right lower quadrant of abdomen radiating across to opposite side. Bowels moved twice this morning after castoria. Sent in by Dr. Hill at 11.10 P. M. Family and previous history otherwise irrelevant.

Physical Examination: P. 120, T. 100°, R. 26. Face flushed, skin hot and dry. Face is drawn and anxious. Chest negative. Abdomen: Tympanitic, not generally distended, moderate spasm and tenderness to right of navel and particularly over McBurney's point. Genitalia and extremities negative.

Operation: Rt. rectus incision, serous fluid escaped. Appendix somewhat clubbed, tied off, amputated, stump inverted. A loop of distended and injected small intestine was brought into the wound and found to lie between the origin of a Meckel's diverticulum and its tip which was adherent to the other limb of the loop and so tense as to partly strangulate the intervening bowel. The tip was separated from its attachment, the base cupped, tied off and stump closed over by Lembert sutures.



Progress: Convalescence was uneventful and patient was discharged on the 10th day.

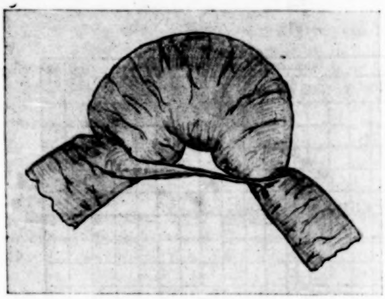
Result: Cured.

CASE No. 4. (Courtesy of Dr. R. P. Watkins, Fairlawn Hospital.)

Name: W. E. B. M., 63, married. Admitted Apr. 2. Discharged Apr. 26, 1924. Condition, cured.

Diagnosis: Intestinal Obstruction, chronic (partial) by Meckel's diverticulum.

History: Trouble began four or five years ago with "gas on stomach" gradually developing epigastric pain and tenderness which he attributed to pressure of a hand-drill. This became practically constant but was sometimes partly relieved by taking food. Has lost strength and weight during the past year. At times abdomen becomes distended with gas causing distress amounting to agony and sometimes accompanied by vomiting. Daily cathartic required. Fears to eat because of gas pains which follow. Always has a bad taste in mouth. Gets out of breath easily.


Strangulation (partial) by adhesion of tip of diverticulum. Hill's case. Hunt's series.

Barring childhood diseases, attacks of tonsillitis and several minor injuries earlier history is irrelevant.

Family History: One brother died at age of 59 of cancer of stomach. mother died at age of 32 of "scrofula of nose," otherwise nothing apparently bearing on patient's condition.

Habits: Tea, coffee, tobacco moderately, no alcohol.

Occupation: Farmer.

Physical Examination: Abdomen: generally tympanitic, marked spasm of upper end of right rectus. Tenderness across whole epigastrium, more to right of midline extending down nearly to level of navel. Definite resistance over gallbladder but it is not palpable. Liver margin 2 cm. below costal border, smooth. No tenderness at McBurney's point. No palpable masses.

Operation, Apr. 3: Dr. Watkins. Ether.

High right rectus incision, exploration showed normal gall-bladder, stomach, kidneys and appendix. During manipulation of intestines in **search of an obstructive growth a diverticulum was found springing from the ileum, opposite the mesenteric border. This segment of intestine was resected and the tube restored by an end to end anastomosis using Pagenstecher for the inner row reinforced by a row of 00 chromic Lembert sutures. Wound closed without drainage.**

Progress: Patient sat up on the 12th day, left hospital on 24th day. Reported to his surgeon 2 weeks later at which time he was eating all varieties of food in usual quantity and having no gas or distress of any kind. Bowels move satisfactorily every day without the aid of cathartics or enemata.

Pathological report: (specimen hardened and somewhat shrunken in formalin) A segment of small intestine measuring 2 cm. at mesenteric border and 3 cm. at opposite border; from the latter there protrudes a conical pouch 3½ cm. long and 2 cm. in diameter at the base. The summit of the cone has been opened, the mucosa edges roll out in a manner exactly like that of the cut ends of the gut proper. The muscular layers are present and distinctly hypertrophied—extending the full length of one side of the pouch and attached in a manner exactly similar to a mesentery is a flattened fatty tab roughly triangular 3 cm. long with its free end rounded and smooth and traversed by free blood vessels from the wall of the diverticulum. When split open the mucosa is seen to be thrown into encircling rugae and is similar to the mucosa in the cross-segment of gut adjoining.

Microscopically: Both muscular layers characteristic of small intestine are present and the mucosa presents villous projections with cylindrical epithelium and rather frequent lymph follicles. some in the sub-mucosa, others in the stroma of the villi. Corresponding to the rugae seen in the gross the sections show projecting processes of the submucous fibrous tissue which fan out and are covered by mucosa. Within these projections the muscularis mucosae is much more developed than in the intervening areas. These folds are quite like the plicae conniventes of the jejunum and suggest the probability that the diverticulum occurred at about the ileo-jejunal junction.

CASE No. 5. (Courtesy of Dr. C. R. Abbott, Clinton Hospital.)

Name, R. L. Age, 8. Admitted Feb. 26, 1924. Discharged March 15, 1924. Condition convalescent.

Diagnosis: Ileo-colic Intussusception. Meckel's Diverticulitis.

F. H.: Father had operation for tuberculous mesenteric glands.

P. H.: Had chicken pox a few months ago. Measles three years ago and whooping cough early in childhood. Had an operation for tuberculous glands of the neck two years ago. Since then the child has tired easily, but has not really been ill.

P. I.: Began early yesterday afternoon with some colicky pain around umbilicus and he vomited. In the evening he had practically no pain, was only slightly tender just below the umbilicus and seemed very much better. In the night he began to have intense colicky pain in the right abdomen and much vomiting. When seen about 10 A. M. today the mother stated that he had a stormy night. He was very tender then in the appendix region and had intermittent pain. Sent to hospital at once for emergency operation. Bowels moved yesterday. Passed no blood or mucus and did not have tenesmus. Voided normally. Has no cold.

Photograph of specimen. Watkins' case, Hunt's series.

Physical Examination: Rather thin boy. Not in distress or shock. Skin fair color. Mouth and throat clean.

Low power photomicrograph of wall of diverticulum.
Watkins' case, Hunt's series.

Lungs: No rales anywhere. No increased dullness. Possibly exaggerated breath sounds in both lower backs.

Heart: Normal percussion limits. No murmur.

Neck: No glands. Two old scars.

Abdomen: Level. No distension. Moderately tender and spastic in region of appendix. Irregular mass felt, not large.

Legs: Negative.

Operation: By Dr. C. R. Abbott. Ether.

Three-inch incision through sheath of right rectus. Some free serous fluid. Caecum lifted —appendix normal. Not removed. There was distortion of the terminal ileum. Something filled the caecum, ascending colon and extended partially into the transverse colon. It was found that the ileum had been invaginated through the ileo-caecal valve into the colon. By repeated gentle traction on the small bowel and pressure on the colon, the invaginated gut was finally removed. At the apex of the intussusception was an almost gangrenous and large Meckel's diverticulum. The intestine regained its color after a while. The diverticulum was excised, its stump inverted and Lembert sutures applied. The intestines were then well washed off and put back into the abdominal cavity.

When reducing the intussusception it was apparent that the diverticulum had first invaginated itself into the gut and that this portion of intestine had invaginated into the more distant portion of the ileum, and that then the mass had passed through the ileo-caecal valve into the colon beyond the hepatic flexure. After reduction some cloudy fluid escaped also. There were several rather large glands in the mesentery nearby. Anatomic closure of abdomen around one small cigarette drain.

Notes: Patient made a good ether recovery, pulse 148 and of good quality.

Feb. 15: Uneventful convalescence to date and is discharged today, well.

May 1: Appears to be a healthy and a normal-acting boy.

Case No. 6. Author's case. Whitinsville Hospital.

W. H. M., 38, m. Supt. of construction. Admitted Sept. 28, 1923. Discharged Dec. 8, 1923. Convalescent.

History: Patient was superintending the drying out and relining of a water storage tank at East Douglas, Mass., during which work he was exposed to fumes from coke-burning stoves (called salamanders) and also from a roofing-compound which was being applied to the floor of the tank. Wed., Sept. 26, his bowels moved in the morning as usual. During the afternoon of that day he began to feel sick. During night had colicky pain and at 3 A. M. vomited. Took cathartics without any relief. Vomited from time to time during day and was given morphine to get him through the following (Thursday) night. Seen in consultation at 3 P. M. Friday, 28th, at which time his condition was as follows:

A tall spare, muscular man, conscious and rational but apprehensive and anxious, vomiting from time to time and having colicky pains in abdomen following each other in rapid succession. Skin moist, tongue red and dry, P. 92, T. 99, W. B. C. 14,600. Abdomen uniformly tense, distended and tympanitic with diffuse tenderness. Liver dullness pushed up 2″ beyond costal border; marked general physical discomfort.

P. H. Always well and has led an active out-of-doors life. Has been subject to dyspepsia characterized by flatulence for which he occasionally resorts to soda bicarb. (Transported by auto to Whitinsville Hospital, where he was admitted at 7.30 P. M. Two high enemas failing to relieve he was operated at 10:30 P. M. under diagnosis of intestinal obstruction, cause undetermined.)

Operation: Dr. Hunt. Ether: Dr. Bouvier.

Right rectus incision centering at level of navel. On opening peritoneum a quantity of bloody serum escaped. Exploring finger encountered a knot of small intestine in right lower quadrant. Enlarging incision downward was able to deliver a loop of small intestine strangulated by a string-like appendage to a Meckel's diverticulum which encircled the bowel and the base of the diverticulum. Cutting this string the loop was released, then treated with hot saline which restored a somewhat more healthy appearance. There was great distention and injection of the bowel above the strangulated loop. Anticipating that the problem of relieving the ileus might call for drainage of the upper bowel the diverticulum was drawn into the lower angle of the wound, secured there by several peritoneal sutures and the wound closed layer by layer.

Progress, Sept. 29: Enemas retained, distention unrelieved. Opened diverticulum, inserted a rubber tube, inverted edges closing them about tube by a purse-string suture. There was immediate escape of gas with partial relief of discomfort. $MgSO_4$ introduced and small irrigations of normal saline ordered.

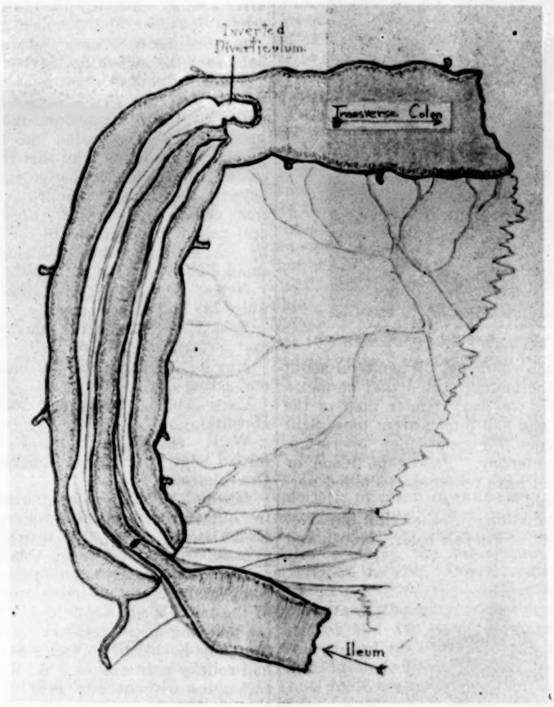
Oct. 1: Vomited explosively about noon but gas and liquid feces are escaping more freely both by tube and rectum.

Oct. 3: Feces appeared in wound and on removal of adjacent stitches a perforation in the wall of the gut at the point of strangulation by the cord had occurred.

Oct. 17: Under gas-oxygen attempted to close fistula by utilizing part of the wall of the diverticulum to fill in the defect.

Oct. 21: Remained dry until today when leakage again appeared.

Oct. 30: Hemorrhaged severely from edge of fistula. Transfused. Under light ether dissected the adherent bowel free from wound-edges, sutured it carefully transversely to lumen of the



Intussusception of diverticulum and ileum into cecum and colon. Abbott's case in Hunt's series.

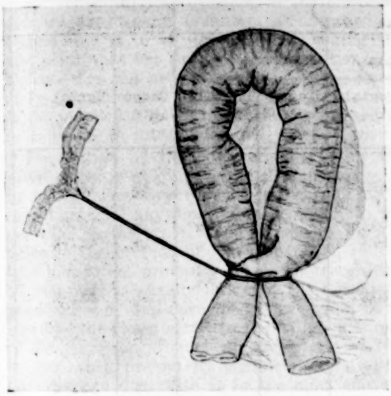
bowel, put it back into abdomen, closed wound except for one rubber-tissue drain.

Nov. 19: Wound nearly healed, no fecal leakage since last operation. Patient gaining strength but complains of pain in left leg and examination reveals a corded vein.

Nov. 25: Began to sit up.

Dec. 8: Discharged, convalescent.

Follow-up note, April 1, 1924: Well except for swelling of left leg.



Strangulation of ileum by filum terminale. Hunt's case.

OPERATIVE TREATMENT

In the matter of what is to be done our attitude must depend upon the situations confronting us; these may be grouped conveniently into four classes in the inverse order of urgency.

(1) *Incidentals*: When in the course of a laparotomy a diverticulum is discovered which is at the time apparently innocent, what shall be done? Porter says that a Meckel's diverticulum when present is a worse menace than the vermiform appendix. Griffith and others agree that in the absence of contraindications the thing to do is to remove it either by ligation and suture, clamp and suture or as the size and shape may dictate. Harbin[9] warns against transverse suture as tending to constrict by the drawing in of the scar. Inversion and suture is contraindicated because of the reported cases where the inverted diverticulum has acted as a bolus, being propelled by peristalsis until the intestine has been drawn in and intussusception resulted. In amputing care should be exercised to leave a sufficient stump so that in suturing the gut the lumen shall not be narrowed.

In deciding whether to do such a piece of preventive surgery the operator must properly weigh its importance in relation to the original object of his operation and not unduly prolong or complicate an otherwise serious situation. The finding of harmless diverticuli at post-mortem is sufficient evidence that their presence is not always to be regarded as certain death.

(2) *The sub-acute, or intermittent obstructive type*:—Fecal impactions or foreign bodies must be dealt with as the judgment of the surgeon dictates. Bettman's[10] wisdom in simply squeezing along the fecal impaction and not meddling with the diverticulum was justified by the outcome equally with the brilliant result obtained by Watkins in Case 4 of my series by resection. The proper weighing of the danger of a procedure against the probability and necessity of a cure is the measure of the surgeon's judgment.

(3) *The inflammatory types*—Having definite pathology with gangrene, perforation or abscess the procedure must be similar to those in appendicitis or rupture of a bowel—The handling of a diverticulum is more difficult than is an appendix because of its larger lumen. More careful attention to security of closure is essential. Wicks against the line of closure are to be avoided.

In this relation a word may be said against the somewhat loose habit of classifying instances of the mere presence of a diverticulum as diverticulitis. Dealing with the one is simple and safe, with the other is serious and the patient's life is in greater danger. The statistics of the two should not be confused.

(4) *The acute obstructive cases*—These are the urgent cases par excellence. In the series here reported three of the cases come in this category, two of which (Hill's and Abbott's) being recognized early as acute surgical crises were operated without delay and were relieved before the viability of the intestine had been seriously affected, uneventful convalescence resulting. The third of this group (author's case) was a delayed case not reaching the table for about 54 hours.

Here there was a well-developed ileus above the strangulated gut which determined me in the procedure followed and which justified itself by bringing about relief of the ileus after two days during which relief of the strangulation had failed to do so. When the unfortunate rupture of the bowel at the point where the cord had constricted it occurred the proximity to the wound and consequent discharge of the feces outward may also be looked upon as a life-saving circumstance though inducing a most trying situation both for the patient and his nurses. The further complication of hemorrhage with the necessary secondary operations for closure of the fistula are strong arguments against a course of treatment based upon drainage of a bowel. It certainly is desirable to do a complete job at first and let the patient get well but resection with anastomosis of a gut already showing paralysis of the upper segment accompanied by duodenal vomiting is foredoomed to failure, in most cases, and in spite of the difficult and protracted convalescence I believe the procedure which allowed for drainage of the intestine saved the situation. The other episodes were accidental and not ordinarily to have been anticipated.

RESULTS OF TREATMENT

In order to discover whether there has been definite advance in our handling of these conditions I have gathered 76 cases besides my own from the English, French and German literature of the past ten years. This probably represents about two-thirds of all the published cases and the analysis as to type of case and the results of operation are shown in the following table.

TABLE OF COMPARATIVE MORTALITY	Prior to 1914				Since 1914	
	Wellington		Drummond			
TYPES OF CASES	Cases op'd	Mortality	Cases op'd	Mortality	Cases op'd	Mortality
Intestinal Obstruction mostly by cords.	108	49%	14	78.5%	22	18.1%
Intussusception,	44	54%	7	71.4%	6	16.6%
Volvulus and adhesions.	8	50%			16	43.7%
Diverticulitis (ac.)	50)		1	0.0%		
Foreign bodies included.	15)	40%			21	23.8%
Hernias.					6	.0%
Umbilical Fistulae.	16)	6%				
Prolapse of bowel.	3)				3	33.3%
Incidental to other operations.					5	0. %
Unusual anomalies.						
(a) Gastric mucosa with hem.					2	50. %
(b) Partial obstruction (stricture, post op.).					1	0. %
New growth						
Cancer					1	
Myomata					1	
Cyst					1	100. %
	244		22		83	

By comparison with the earlier results a distinct betterment is shown, doubtless due for the most part to earlier operation, though advances in technique and anesthesia should receive some share of the credit.

DIAGNOSIS

I have purposely deferred consideration of diagnosis for the conclusion of my paper for in this direction more than any other lies the opportunity for improvement.

The open types are, of course, practically self-evident.

It may be stated as a general proposition that the closed types cannot be diagnosed when involved in an acute crisis. The X-ray may enable us to presumptively diagnose the presence of a diverticulum under such conditions as existed in Case 1 of this series.

Our aim should therefore be to establish the working diagnosis of intestinal obstruction and to operate early, ever keeping in mind the possibility of a diverticulum or its appendage. We are justified in surmising it to be the causative factor in cases of young males having experienced no previous operations or hernias, or in persons having known developmental defects, especially the history of an umbilical sinus in infancy or early childhood. A past history of attacks of abdominal pain without diarrhoea or fever and relieved spontaneously or by cathartics or enemata is consistent with such a cause.

Physical evidence obtained by examination of the abdomen is of little help as the signs nearly always consist of a tender fulness in the lower right quadrant and simulate appendicitis. Distension may be late in appearing. Rarely an attached diverticulum so pulls on the navel as to cause a funnel-like depression with the navel at the apex. Blood or mucus in the stools is rare but may occur with intussusception or in rarer forms of diverticulitis. Hemorrhage was the chief symptom in two cases having gastric mucosa in the diverticulum.

Of course, surgeons must depend to a large extent upon the general practitioner to bring about continued improvement in the mortality rate insofar as early diagnosis is concerned. I believe this is to be developed by urging the viewpoint that the duty of the practitioner to his case does not necessarily lie in his ability to make a complete, definite and final diagnosis as to the particular lesion but rather in his ability to diagnose an intra-abdominal surgical crisis.

Recognition of the obstructive type in the early stages is of quite as much importance as in the inflammatory type of lesions and early operation is, if anything, more necessary in the one than in the other. The paramount importance to the surgeon of early operation should lead him to act promptly upon the recognition of such crises. Appreciation of the disastrous possibilities of well-developed ileus should be to him like the storm cloud to the sailor, a threat of danger to be avoided where possible and to be met when present by complete mental preparedness to deal with it in the most efficient manner.

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Discussion

Dr. P. E. Truesdale, Fall River: Dr. Hunt has covered all the essential points on Meckel's diverticulum. I am very sorry that I know so little about such a rare cause of intestinal obstruction, but I learned a great deal from his excellent presentation of the subject. I was hoping that Dr. Hunt would also deal with intestinal obstruction because we are vitally interested in the treatment of intestinal obstruction due to Meckel's diverticulum and other causes. Therefore, I shall limit my remarks to a discussion of intestinal obstruction from that and other causes. Our mortality in a series of 70 cases was found to be 32 percent. That needs to be corrected because I am sure that our mortality is higher. In that group of cases many followed operations for appendicitis. They did not come into the hospital with acute intestinal obstruction. In the latter type I am sure our mortality approached 50 percent. John B. Murphy's mortality was 40 percent; Dr. Deaver's mortality was 42 percent. In Deaver's series those patients who recovered were operated up on within the first 60 hours; and among those who died the operation was done 97 hours after the onset of the obstruction. That is about the story that is told in other countries. Moynihan had an operative mortality of about 50 percent. He said that to operate early in cases of acute intestinal obstruction is an experience few surgeons enjoy. At St. Bartholomew's Hospital a record of 50 cases shows a recovery of only 15.

When the operation is done within the first 24 hours, the obstruction relieved, and the gut viable, the results are generally good; but there is probably no greater causes of mischief than the use, or perhaps the abuse of cathartics before the patients come to operation. That always aggravates the obstruction, always produces a more alarming picture.

The operation is done, whenever possible, under local anesthesia. That is our method, particularly in old people. They bear general anesthesia very poorly. When the operation can be done early and speedily, we expect to have a lower mortality by far than 50 percent.

Drainage of the bowel contents by enterotomy is a mooted question. It is true that the highly toxic material can be withdrawn in this manner, but why remove it? The damage has been done. When the obstruction is relieved, the bowel contents will move on in the natural way, and if the rectal sphincter is well dilated there ought to be no further damage to the patient from bowel contents.

Dr. John E. Summers of Omaha has advocated the operation of enterotomy, using the jejunum. Draining at that point he believes to be most effective and the higher the opening the better. After opening the bowel he inserts a 22 French catheter and leaves it in position for 48 hours. We have tried it a few times but without success, probably because the method was adopted too late.

I am waiting for someone to devise successful measures for getting these cases into the hospital within the first 24 hours; measures for preventing the use or abuse of cathartics; and for someone who will sufficiently urge me to operate early on my own cases of post-operative obstruction.

Dr. E. L. Hunt, Worcester (closing): Just one word about enterostomy as a protective measure—in my case I relieved the constriction all right but his ileus didn't improve, and I dilated his sphincter also, and nothing came through and he continued to vomit. Then I opened the diverticulum, and great gushes of gas and foul liquid matter escaped; the next day his lower bowel opened up. It was a desperate expedient, but I think that saved his life. It was the one thing that gave me success as against failure.

I have tried proximal enterostomy with success in some and in one of my cases I lost out because it leaked around the tube, and the patient had peritonitis: but I am sure the patient would have died anyway if we hadn't tried it. Early diagnosis is the essential thing; early action, of course, is predicated.

INTRAVENOUS USE OF MERCUROCHROME

BY DR. F. S. HOPKINS, SPRINGFIELD, MASS.

[From the service of Dr. R. B. Ober, Springfield Hospital]

The work that has been done by Dr. Hugh Young and his associates in the use of antiseptics in the circulating blood[1] may prove to be a truly great contribution to surgery. He has reported definite cures of two cases of septicemia and five cases of deep seated infections by the intravenous use of mercurochrome.

With this as an inspiration we have made use of intravenous injections of mercurochrome in twelve patients at the Springfield Hospital, though without such brilliant results. The dose that we have used has been based on the recommendation of 5 mg. per kilogram, which for practical purposes in the average adult can be considered as 30 c.c. of a one percent solution. This dose may be safely repeated on successive days. Each injection is usually followed within an hour by a chill and a rise of temperature of about one degree. There may be temporary gastro-intestinal symptoms and even a brief period of albuminuria following its use.[1] Dr. J. C. Bunten[2] has reported two cases of salivation after the otherwise satisfactory use of mercurochrome. In our own experience, we fortunately escaped the more severe complications, but on the other hand we have failed to secure any miraculous cures.

CASE REPORTS

Our first case, J. F., was that of a debilitated man of 71 with a streptococcus cellulitis of the left lower leg. He entered the Springfield Hospital March 1, 1924 with a superficial abscess over the knee which was incised and drained. Three days later he had a cellulitis extending downward to his ankle. He was given 30 c.c. of one percent mercurochrome intravenously with practically no reaction. On the 6th his general condition was much worse, and the same dose was repeated. He died on the following day. We do not believe that the mercurochrome had any influence in this case.

P. C., a man aged 37, was admitted to the medical service Feb. 20, 1924 with rather severe diabetes and early gangrene of the left second toe. Amputation above the ankle was advised, but refused. On insulin treatment he became sugar free, and for a short time the appearance of the toe improved. On March 13th the toe was amputated under local anaesthesia. The stump became grossly infected, and the infection extended up the leg. On the 17th he was given 30 c.c. of one percent mercurochrome intravenously. This was followed in half an hour by a severe chill and a rise in temperature of two degrees. During the next few days there was marked improvement in the appearance of the stump, and the infection of the leg disappeared entirely. However, he eventually required the original recommendation of amputation above the ankle, which was done April 14th.

In this case there was a decrease in the local infection after the intravenous treatment, and a complete subsidence of the extending infection. Repeated injections might have been advisable.

J. B. C., a feeble minded man aged 34, was struck by a locomotive March 17, 1924 and brought at once to the Springfield Hospital. He had sustained a fractured skull with laceration of the brain, traumatic amputation of the left upper arm, and of the right 4th and 5th fingers, and wounds of the scalp and eyelids. All wounds were ground full of cinders and dirt. The immediate treatment was for shock. The wounds were dressed with two percent mercurochrome On the following day he was given as a prophylactic an intravenous injection of 30 c.c. of one percent mercurochrome, followed by a chill nearly two hours later. There was no evidence of infection of his wounds March 20th, and a debridement was then done. He became increasingly irrational, incontinent, and restless, and repeatedly tore off his dressings. His temperature ranged from 99.6 to 103. On the 24th there was a little serous oozing from the stump of the left arm with a negative culture. Another similar injection of mercurochrome was given, which was followed by no reaction. The evidence of brain laceration became more marked. He had several clonic convulsions, and on the 29th he died with a terminal temperature of 106.

Considering the extent of this man's injuries, it was surprising that he lived for twelve days, and that the wounds remained free from gross infection. The original use of mercurochrome dressings may account for this, yet we feel that the intravenous injections probably aided in the avoidance of infection.

E. W., a man aged 63, was operated upon March 4, 1923 for a recurrent right inguinal hernia and a right femoral hernia. Four days later there was a purulent discharge from the wound which showed staphylococci when cultured. A local mercurochrome dressing was used. An extensive infection persisted. On March 20th an intravenous injection of 30 c.c. of a one percent solution was given which was followed by a slight chill. The wound was well healed April 1st. The value of the intravenous injection in this case is doubtful, for the wound might have healed equally well without its use.

G. T. was a man aged 56 who was brought to the hospital March 20th dying with lobar pneumonia. As a last resort he was given 30 c.c. of one percent mercurochrome, but he died eight hours later. Since this patient was practically moribund on admission, nothing short of the miraculous could have prevailed.

H. M. B., a woman aged 31, was admitted March 20th with an extensive subpectoral abscess following a scratched finger. She was very toxic, delirious, and cyanotic, and had a temperature of 103.6. The abscess was drained, and showed streptococcus hemolyticus when cultured. On the following day the inflammation had extended down the flank to the hip. She was given 30 c.c. of one percent mercurochrome intravenously and in an hour she had a rather marked chill. Her delirium cleared entirely in two hours. Commencing about three hours after the injection and for the next two days her pulse was very rapid and irregular, but then slowed and became regular under the influence of digitalis. On the 24th she was given some antistreptococcic serum which was followed in fifteen minutes by a chill. Abscesses localized in the posterior axillary line and were drained on the 28th. Thereafter she steadily improved and was discharged April 25th. The intravenous use of mercurochrome seemed to result in the disappearance of her delirium, but it also apparently had a toxic effect upon her heart. We felt, however, that it was of definite value.

B. H., a girl aged four years, was admitted March 24, 1924 with an acute empyema, one week after the onset of pneumonia further complicated by a bilateral otitis media. Her pulse was 160. An immediate operation was done consisting of the insertion of a catheter into the empyema cavity. Two ounces of pus were removed every six hours for forty-eight hours when the chest was emptied. Irrigations with Dakin's solution were used every three hours. She was very restless and irritable and in rather poor general condition. On the 31st she was given 15 c.c. of 0.4 percent mercurochrome intravenously without any reaction. For nearly a week following this she seemed stronger and less restless and irritable. Her temperature dropped from 101 to 99.6. She then grew rapidly weaker and more toxic and died on April 8th. In this case there was apparent improvement after the use of mercurochrome, but the child was unable to withstand the continued infection.

G. H., a boy of twelve, was operated upon March 11, 1924, when a ruptured, gangrenous, retrocecal appendix was removed. After ten days his temperature rose to 104.3 as a result of walled off abscesses in the peritoneal cavity, which were then drained through the old incision. His fever persisted till the 27th when he was given 30 c.c. of 0.5 percent mercurochrome intravenously. After a slight chill his temperature dropped nearly two degrees. On the 30th his temperature had again reached 104.3, and the injection of mercurochrome was repeated without other effect than a slight chill. An abscess beside the sigmoid was drained through a lower left rectus incision. Thereafter he steadily convalesced and was discharged with all wounds healed on April 30th. Although the first injection of mercurochrome was followed by a definite drop in temperature, I do not consider that its use proved of much benefit in this case.

A. B., a man aged 29, entered April 1, 1924 with a large carbuncle involving the entire lower lip which was three cm. thick and everted. His temperature varied from 100.4 to 103.6. He was given 30 c.c. of one percent mercurochrome intravenously with very little reaction. This injection was repeated the following day. Saline dressings were used locally. No operation was performed. The infection subsided rapidly, and he was discharged on the 13th with a practically normal lip. Although a carbuncle of the lip may heal spontaneously, I believe that the mercurochrome was of distinct benefit in this case.

H. K., a woman aged 64, was admitted March 30, 1924 with a staphylococcus tenosynovitis of the right index finger and cellulitis of the hand which had been incised three days previously. Further incisions were made at once, and drainage was instituted. On April 13 she was given 30 c.c. of one percent mercurochrome which was followed in an hour by a chill lasting thirty minutes and a rise in temperature from 101.6 to 102.8. On the following day her temperature had dropped to 98 and remained about 99 for four days. On April 11th her temperature was 100, and the intravenous use of mercurochrome was repeated. Half an hour later she had a chill with a temperature of 102. It then stayed normal for a week, when she developed an osteomyelitis. This required amputation of the index finger including part of the metacarpal which was done on the 22nd. The wound was granulating well when she was discharged May 7th. In this case the use of mercurochrome was followed by a definite drop in temperature, though it did not check the development of an osteomyelitis.

H. B., a woman 27 years of age, was admitted April 3, 1924 with a general peritonitis and in a moribund condition. An intravenous injection of 30 c.c. of one percent mercurochrome was used. There was no reaction. She died less than nine hours after admission. Autopsy showed a pneumococcus peritonitis. This was one of those hopeless cases for which we are glad to grasp at any straw which may be of assistance. Mercurochrome was that straw.

W. H., a colored man aged 39, has been residing at the Springfield Hospital since August 14, 1923. He has a watering pot perineum as part of a long story of infection, stricture, urethrotomy, and supra-pubic cystotomy. His many sinuses drained a small amount of pus which showed staphylococci when cultured. He was given 30 c.c. of one percent mercurochrome intravenously on April 5th and 15th. Both injections were followed by chills but did not have any appreciable effect upon his infected sinuses. This is another instance of the trial of mercurochrome as a vain hope, for we could hardly expect any satisfactory result in such a case.

CONCLUSIONS

Our experience with the intravenous use of mercurochrome has not equalled the expectations to which our hopes were aroused. Of the 12 cases there were 5 in which it was of no benefit, 5 of temporary or doubtful benefit, and 2 in which we considered it of definite value. Even in these cases it is impossible to prove that the results obtained were due to the use of mercurochrome. The cases in which temporary improvement was secured might indicate that daily injections should be used over more prolonged periods. The reactions following its use were not at all alarming except in one case (H. M. B.) where a rapid and irregular pulse occurred. This, however, responded promptly to digitalis.

We do not believe that intravenous mercurochrome should replace any generally recognized indication for surgical treatment. We do feel, however, that in many cases of infection that are not readily controlled by simple surgical procedures it is of sufficient value to warrant continued trial. In cases of septicemia we consider that it should always be used, for it offers a hope of cure in an otherwise usually fatal condition.

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chrome-220 Soluble and of Gentian Violet. Jour. A. M. A., 82:669, March 1, 1924.

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DISCUSSION

Dr. E. L. Young, Jr., Boston: Mr. Chairman and Members of the Section: When any agent has been advocated and backed up by as prominent an authority as is the case with mercurochrome, I think anything that will help us stabilize our ideas on the subject is important. For that reason I think the series of cases which Dr. Hopkins has reported is far from needing any apology. I think it helps us to get the real facts of the case. Any agent that can do what was claimed for this or what the profession in general seems to think it can do, must be absolutely free from danger; for if it doesn't do very much but has got some danger, it has got to be discarded.

It seemed to me that the best thing I could do in discussing this was to get the opinion of as many men as I could in Boston who had used it. I got the opinion of the men at the Massachusetts General, at the Children's and at the City, including Dr. Mallory. The number of cases is about 20; and to give the conclusions first and details afterwards—I will say that no one with whom I have talked has got the feeling that it has been of distinct benefit in any case. There have been cases in which it did seem to help but with no controls and always in cases in which there were other reasons for recovery, nothing definite could be said. From my obstetrical friends there were four cases of puerperal sepsis all of which recovered; but that is generally an infection with the hemolytic streptococcus and has a tendency to recover. In none of these was there a blood culture made. One of the cases had a terrific reaction; the pulse went beyond the counting stage, and she was in a state of collapse. She did, however, recover from the collapse though it looked as if the injection was going to kill her. In one case of mastoiditis and meningitis in a child it was given with recovery, but Dr. Howell said he didn't feel that the recovery was necessarily due to that. There were six cases at the Massachusetts General, and in two of those it seemed beneficial. One of those was a bad compound fracture of the lower leg with an initial attempt to save the leg. The result was that the leg went badly septic, and then an amputation above the knee was done, and intravenous mercurochrome was used, and the boy recovered; but I think we have all seen recovery following similar cases with amputation alone. The interesting thing was that the boy did have a culture of streptococcus viridans; but the note made by the pathologist is that this may have been a bacteriemia rather than an actual infection. Of the four cases there was one case of jugular thrombosis with streptococcus hemolyticus with recovery. There was drainage of the abscess in that case. And then of the others there were two of streptococcus, and one of staphylococcus in the blood. At the Children's Hospital they said that in the cases where it was used, it seemed to have no effect. In one case the blood culture was checked up after injection and the growth was more profuse than before. In none of the cases did Dr. Lamman think that the drug had any effect on the infection.

There was one case reported at the City Hospital where there was a blood culture of streptococcus viridans, and the patient was given multiple injections of mercurochrome and blood cultures taken after the injections, and there was no change in the growth. There was no reaction but no beneficial effect. The case ended fatally.

Now the important thing is the hint that we get that instead of being always a stable solution, it does break down occasionally, and we get the poisonous effects of mercury as shown by salivation and intestinal symptoms; and I hope there will be a report coming from Dr. Mallory's laboratory on the details of the autopsies in three cases that received the drug and which seem to bear out the possibility of some poisonous reaction.

Just a word about another use to which it has been put at the Massachusetts General Hospital —empyema with bronchial fistula—Dakin's solution is extremely irritating if there is any bronchial fistula and it is almost impossible to use it. Dr. Whittemore thinks mercurochrome is worth using in those cases because it hasn't the irritating effect. I have myself put it into an old chest cavity and seen it spat out of the mouth at once without any suggestion of bother on the part of the patient.

Dr. E. L. Hunt, Worcester: I would like to mention a puerperal sepsis case with streptococcus hemolyticus in the blood stream in which I used mercurochrome. There followed a terrific diarrhea with incontinence of urine, at autopsy the liver was almost white and the kidneys white and edematous. We recovered mercury from those organs with the ordinary test, showing that there must have been a dissociation of the mercury from the dye.

Dr. L. S. McKittrick, Boston: I want to report a case that came into the Deaconess Hospital with diabetes and gangrene of the toes. A blood culture taken proved the streptococcus hemolyticus to be present. The man was given intravenous mercurochrome. He was given it one day in half prescribed dosage. We felt that this was poor therapy because we did not reach the proper concentration in the blood. He was then given it in full dosage and he had intense diarrhea and died. It did not seem to have made any impression on the course of the septicemia, but the pathologist called attention to the marked oedema of the kidneys. It was so intense that the pathologist called special attention to it and was going into details to see whether or no the mercurochrome had any effect on the kidneys.

I would like to know from Dr. Hopkins what the pathology of the kidneys showed at autopsy in his cases.

Dr. P. P. Johnson, Beverly: I think it ought to be borne in mind in administering mercurochrome that the reaction may be very intense. We had an experience with three cases at the Beverly Hospital in which the gastro-intestinal reaction was very profound. It seems to me such a reaction might turn the scales, so we ought to remember that the administration of mercurochrome isn't an innocent procedure.

Dr. F. S. Hopkins, Springfield (closing): I think we happened to be lucky in our reactions. We had no severe ones. In the two cases in which we had autopsies the kidneys were normal in the gross but no microscopic examination was made.

THE RELATION OF THE SURGEON IN INDUSTRY TO THE FAMILY PHYSICIAN

BY HAROLD G. GIDDINGS, M. D., BOSTON

An experience of several years as Staff Surgeon at an insurance clinic through which pass upward of 30,000 cases yearly and as plant surgeon to an industry employing an average of a thousand or so men and women has brought about a very definite crystalization of ideas as to what the relations between the family physician and the surgeon in industry should be, and secondly, as to how the relations between these companies which deal in compensation insurance and the medical profession, as a whole, may be improved.

It is true that there has been, and is now, a very distinct feeling on the part of the general practitioner, and throughout the profession at large, that the insurance companies are not giving them adequate returns for the service rendered to compensation cases; and if those cases could be placed on a parity with our private patients, this feeling would undoubtedly be correct. But, because of the operation of the compensation law, these men and women who have been injured in industry are, speaking from a sociological standpoint, in a group quite distinctly by themselves. A review of the history and growth of Workmen's Compensation, since its adoption by the State in 1912, will, perhaps, make this more clear.

Prior to passage of the law the injured employee had sought aid wherever he chose and entirely upon his own responsibility. The result was that in accidents of any consequence with lengthy disability, the worker had no funds with which to pay for his treatments, and the employer declined the responsibility; while in lesser injuries, the workmen frequently evaded their financial obligations. In the great majority of cases, the doctor was the loser.

As soon as the compensation law became operative all this was changed. It made the insurers responsible for the doctor's bills over a stated "legal period" of two weeks, and in "Unusual cases" over whatever period the injured employee required treatment. The great majority of the profession accepted and carried out these provisions in good faith, but there were, unfortunately, some doctors who hailed this two weeks legal period as an opportunity to make some easy money at the expense of the insurance companies. So, it was not long before the insurers began to receive from these men bills often manifestly padded, and entirely out of proportion to the character of injury they were treating. It was truly remarkable how abruptly and completely well employees became on the fifteenth day, who, for the preceding two weeks had required the services of a doctor, two, three and sometimes even four times a day! At this point it is only fair to say that while such bills are occasionally presented, the practice of submitting them is much less frequent now than in the earlier days. The receipt by the insurers of so many obviously padded bills naturally had the effect of putting them on their guard, of making them suspicious of the profession as a whole, and of leading them very closely to scrutinize and to question all medical bills whether rendered unjustly or not. And their attitude, in turn, very naturally offended those physicians who were manifestly trying to be fair, as well as rebuked those who obviously were not.

Besides the foregoing there have been two other important factors in creating a misunderstanding between the insurers and the physicians. The first is that under the terms of the Act the medical compensation bills are subject to review by the Industrial Accident Board, which has fixed a more or less arbitrary scale, commensurate, oftentimes, not with the fees that many of the doctors are accustomed to receive in their private practice, and to which they feel they are rightfully entitled, but based rather on what the Board considers would be a fair charge for the community in which the employee lives were he to pay the bill himself. And, in this connection, it must be borne in mind that payments made by the insurance companies are as much subject to review by the Board, as are bills rendered by physicians. The second cause of friction, because it has not been understood, is the fact that the companies have refused, as they must under the law, to assume the bills of cases which investigation has shown to be non-industrial. Because of the vast number of bills thus questioned, the profession early received the impression, from which it has by no means recovered, that the insurer's policy was to question each and every medical bill rendered.

One of the results of the rather acute medical situation in the early days of the Act was the employment, by the various companies, of certain physicians who manifested an interest in the work, who learned by experience what was required, and upon whom the companies felt that they could depend. These men, or groups of them, were called upon to respond to emergency calls at various plants, to visit injured employees in their homes when necessary, to submit reports as to the nature of the accidents, and to estimate disability.

Unfortunately, in the beginning, the type of doctors who as a group went into this work was quite different from what it is at present. Whereas today the work attracts many high-grade, well-equipped men, the opposite was true a decade or so ago. The insurance companies obtained for a low figure physicians who in many instances had no scruples about their work, and often conducted it in a slip-shod and unethical manner. The companies soon found, however, that employment of such men did not pay and gradually replaced them by those of distinctly superior caliber. But the first type has left its mark, which can be eradicated only through the maintenance of high-grade staffs by the companies and by the placing of industrial surgery on a plane thoroughly in keeping with the best traditions of the profession.

The establishment of industrial clinics came as the next and logical step. Starting, as most of them did, at first, in small cramped quarters, with but the barest necessities to work with, many of them have grown until today they equal the outpatient departments of our great municipal hospitals in equipment, in their methods of handling patients, and in the end results they obtain. And, their records must be well kept, because of the potential legal complications of every case.

To conduct these clinics the companies employ their own staff doctors, who, doing intensive work and seeing literally hundreds of accident cases of all conceivable sorts every month, become experts, not only in the field of traumatic surgery, but also, under these circumstances, in its closely related legal aspect. The companies naturally regard these men as a valuable part of their equipment, and are able to offer their skill as part of the service which they sell their policy-holders.

As employers and employees alike came, through the agencies just described, to appreciate the value of proper and prompt surgical aid as an economic factor in cutting down lost time, many factories introduced their own plant hospitals, employing, according to their needs, either part-time or whole-time surgeons, furnished in many instances by the insurance companies. Meanwhile the safety engineering and social service movements were being developed with the doctor playing an important role in each, and thereby increasing further his value to the plant and to the insurer.

From this account of the progress of workmen's compensation, and of the development along with it of the surgeon in industry—for the two have gone hand in hand, the latter being the natural corollary of the former—it is obvious why the family physician should feel as he does and regard with suspicion the surgeon whom he knows to be retained by an insurance company, or by a plant. It is natural that he should look on him as a corporation representative whose primary interests are those of his employer, and whose concern for the family doctor and the patient's welfare he may consider secondary. That such a feeling, which is entirely the outgrowth of the circumstances above detailed, should exist, is unfortunate. It is not a feeling, however, which may not be overcome. The following suggestions are made as means to that end.

Once the surgeon in industry has obtained the confidence of the insurance company or the manufacturer by whom he is employed, he is in a position where he may be of influence in directing the policy of his company and in winning for it the goodwill of the profession at large. The insurer and the employer of labor are in business for the primary purpose of making money and are not especially concerned with the ethics of the medical profession. But, since the laws in most of the states are, perforce, bringing the insurer, the employer, the employee, and the medical profession together, they should meet on the common ground of friendliness and with a desire to be mutually helpful and considerate of the other fellow's rights.

From the foregoing it is obvious that the surgeon in industry occupies a peculiarly strategic position, in which he can view both the economic and the professional aspects of the situation, and, in the role of mediator, soften many of the differences between the medical profession and industry which may arise. He may, for instance, be asked by a physician, not familiar with compensation work, just what sort of bill to present, or be requested by the company to pass upon the fairness of medical bills. Let him advise, in the first instance, after careful analysis, the rendering of a bill which shall be fair to the physician himself, and, at the same time, conform to the industrial standards for the type of services given; and, in the second instance, payment of a fee commensurate with the standards of the particular community, and with the doctor's standing in that community. It is surprising how much this spirit of helpfulness will do to bring about good feeling. Not infrequently the family doctor may send a patient to an industrial clinic for examination, opinion and advice. The opinion or advice sought should immediately, or as soon as obtained, be transmitted to the doctor and the patient returned to him for further treatment, provided this arrangement is what the doctor and the patient desire. Failure on the part of a clinic, under these circumstances, to send a patient back is to be vigorously condemned. If it occurs, the surgeon on duty is much more likely to be at fault than the company itself.

Many of these industrial cases, of course, require treatment longer than the designated two weeks period. Very often they are not recognized by the Board as "unusual." Not infrequently these patients, who, during the legal period, have been under the care of their own doctor, prefer to continue with him beyond that time. Although, according to law, the insurer is not liable for such overtime treatment, he may, if he so elects, provide for it. It should be the duty of the staff surgeon when he makes the customary examination for his company to ascertain the patient's wishes in this matter and if they be to continue with his own doctor, so to recommend. Such suggestions are usually honored, and deeply appreciated by both the doctor and the patient.

Again, disabled ambulatory patients living a considerable distance from the clinic often find the journey there either actually painful or financially burdensome. In these instances, if the employee wishes to continue with his own doctor beyond the legal period the insurer should give his consent, assuming obligation for the overtime payments, with the understanding, of course, that the attending physician is competent.

Very often at industrial clinics one sees both medical and surgical cases obviously not of industrial origin. The insurer is not expected, of course, to treat these patients. Many of them do so, however, in order to keep the good-will of their policy-holders, some of whom take offense if the insurer declines to give treatment, and also as an accommodation to the employee. This, in our judgment, is an injustice to the patient's physician for it deprives him of work which legitimately belongs to him. Whenever one of these cases appears at the clinic the situation should be explained to the employee and he should be advised to consult his regular doctor; and certainly no reasonable employer, after the situation has been explained to him, could possibly take offense. Incidentally, these non-industrial cases may act as boomerangs, for once treatment has been given, the Board is apt to regard this fact as an admission of liability on the part of the insurer, and should serious complications arise the insurer may find himself in an unpleasant situation.

Surgeons in industry are often asked to see an injured employee in consultation with the latter's own physician. The request may come either from the insurer or from the doctor, and for a variety of reasons which need not be detailed here. If he will but approach the consultation in the same spirit that he would a private one, the consultant will go far in winning the good-will of the physician and in overcoming a prejudice, which, as already pointed out, is the natural outgrowth of the operation of the Compensation Act. On the other hand, the employee's physician should show an equally fair spirit. If the case requires operation and the attendant is qualified to perform it he should be given the privilege of doing it. The consultant may be present, if such be the physician's wish, to share responsibility.

Very rarely the consultant may observe as a result of his wide experience that the physician is not applying adequate or proper treatment. It is a very easy matter for him gracefully to point out wherein a change might be helpful. Suggestions of this sort, given in the right way, should be welcomed and not cause offense, even though the consultant is present at the company's request, for the physician should feel that he is receiving the benefit of trained advice. In making the reports on these cases it is a simple matter for the consultant to incorporate a good word on behalf of the physician. Such courtesies go a long way in cementing friendship between the physician and the company; and, certainly, unless he feels that the case is actually being mishandled, the consultant should refrain from any adverse comment.

Many physicians see but comparatively few of these industrial cases, treating them incidentally as part of their routine work when they come along. Oftentimes the doctors do not know just what procedure to follow. This refers not so much to the actual treatment as to the legal procedure. They may know neither the rights of the injured employee nor their own. It may at times be necessary for doctors to seek advice on these points. They should be told freely and in detail just what to do under these circumstances, and the opportunity taken to point out to them the information the insurer desires in the reports which they should submit.

If the medical schools would seek affiliation with these industrial clinics, they could offer their students unlimited opportunity for the study of traumatic surgery, while the profession, through their use, would become much more conversant with the management of industrial cases; likewise, the insurance companies and manufacturing plants maintaining clinics should be encouraged to make them available for teaching purposes. Up to the present time, so far as we know, this has been done in only one or two instances, because of the feeling on the part of the insurers that it would be poor policy to do so and would meet with the disapproval of their subscribers.

In conclusion I would point out that the foregoing paragraphs represent the attempt of an impartial observer, who has had an unusual opportunity to view both sides of the question, to analyze the situation which, as he sees it, is due in large measure to the operation of the Workmen's Compensation law; and to make certain suggestions, easy of adoption, and based entirely on personal experience, which, if carried out, will, he believes, do much to overcome the prejudice which today exists.

ZINC STEARATE INSUFFLATION IN INFANCY

BY EDWARD SCOTT O'KEEFE, M. D., BOSTON, MASS.

[From the Children's Medical Service of the Massachusetts General Hospital]

THE subject of zinc stearate insufflation was first mentioned by Heiman and Aschner[1], who reported twelve cases in June, 1922. As pointed out by them, it is one of the recent mishaps of the nursery. It has followed the popular substitution of zinc stearate for the old talcum dusting powders.

Zinc stearate is a compound of zinc acetate and castile soap. Owing to its very light and fluffy nature, it is dispensed in cans with large orifices in order that there may be free flow of the powder, when required.

The insufflation always occurs in the same manner. The victims are between eight months and a year of age, active, but not usually sitting up with ease. The powder box is given as a toy. The infant lying on his back holds the box up for inspection. He is surprised by a shower of powder falling in his face, gasps, and so inhales and swallows varying quantities of the zinc stearate.

Following this chain of events the clinical picture varies from that of an undisturbed infant to that of laryngeal and bronchial obstruction. In the cases where but a small amount is involved, no disturbance results. In other cases, however, there is, in a few hours, an increase in pulse and respiration followed shortly by an elevation of temperature. The child in some of the cases presents supra and infra sternal retraction with aphonia, a picture difficult to differentiate from laryngeal diphtheria, without the aid of the history. Other cases present more of the appearance of a bronchopneumonia. In this type the temperature remains for several days between 102° and 103°, pulse 150-160 and respiration 60-80 a minute. The temperature usually drops to normal several days before the pulse and respiration. The white count is not elevated and X-rays of the chest do not show definite signs in most of the cases.

CASE 1. D. D. Male, 8 mos. old.

F. H. and P. H. unimportant. P. I. Five hours before admission infant was left playing with a can of zinc stearate. Found gasping and choking with powder on face, and in mouth and nose. Ipecac was given and vomiting followed. Within an hour respirations became rapid. Child refused to nurse.

Upon admission to the hospital physical examination was negative except for rapid pulse and respiration of 70, with a temperature of 102° rectal.

The following day many fine moist râles were heard over the lower right back. X-ray and fluoroscopic examinations of the chest were negative. White count was 12,000. Urine negative. Patient was well on the ninth day.

CASE 2. J. N. Male, 9 mos. old.

F. H. and P. H. unimportant. P. I. Child inhaled zinc stearate in the usual manner. Emetic given. Sent to hospital the following day. On entrance T. 101, P. 145, R. 50. Physical examination showed moderate dyspnoea. Chest showed nothing abnormal. Temperature, pulse and respiration subsided to normal within 8 days. Urine negative.

CASE 3. R. W. Male, 11 mos. old.

F. H. and P. H. unimportant. P. I. Patient seen in the Emergency Ward three hours after having inhaled zinc stearate. Since shortly after the accident the child had been in a semi-stuperous condition.

Upon examination child presented a temperature of 103° R., P. 150, R. 80. Lungs were clear. Nothing abnormal found in the other systems.

This child ran a temperature of 102° to 103° for four days, at the end of which time the temperature dropped to normal. Pulse followed and respiration returned slowly to normal within four more days.

X-ray of chest showed nothing abnormal.

White count was 14,000. Urine negative.

CASE 4. R. W., 10 mos., male.

F. H. Neg. P. H. Unimportant. P. I. Two hours before time of examination infant had inhaled zinc stearate. Mother, attracted by child sneezing, found small amount of powder about nose and mouth. This child showed no elevation of temperature and only slight respiratory obstruction for twenty-four hours and cleared up without other difficulty.

CASE 5. P. C. 10 mos., female.

F. H. and P. H. unimportant. P. I. Seen shortly after inhalation of zinc stearate. Showed nothing abnormal physically. During the night, however, respiratory difficulty was reported. Temperature of 101° was found on the day following. This temperature persisted for three days with moderate respiratory difficulty as evidenced by supra and infra sternal retraction. Condition gradually subsided.

CASE 6. B. Y. 10 mos.

F. H. and P. H. unimportant. Seen 18 hours after having spilled zinc stearate over face. Was reported to have become cyanotic a few minutes after the accident and to have soon shown marked respiratory difficulty.

Respirations were rapid and grunting. Slight supra and moderate infra sternal retraction. No abnormal dulness. Throughout the right chest many medium moist râles. Left back shows area of 3x3 cm. of med. moist râles in the post-axillary line. Signs subsided gradually in a week's time.

The zinc under these circumstances acts in two ways: First, as a systemic poison, and second, locally as an irritant.

Regarding the first or systemic effect, I was interested to know at first hand the clinical picture of brassfounder's chill, which is, of course, a zinc poisoning. Of this condition Dr. H. J. Cronin[2], of Cambridge, gives the following account from his industrial experience: "The principal symptom is a severe chill, which may occur a few hours after inhalation of the zinc fumes. A short exposure is often sufficient to produce an attack.

"The usual symptoms are severe chill lasting from one-half to three hours, with fever, sweat and then malaise. The workers may have these symptoms during working hours but usually they occur at night, viz., several hours after the exposure. The attack ends almost by crisis in from two to twenty-four hours. The blood findings are normal. The treatment is entirely symptomatic. Hot drinks are generally advised. Zinc poisoning among industrial workers has no immediate serious consequences, but there is an increased susceptibility to respiratory infections." Among the infants there is the critical defervescence noted in adult zinc poisoning.

The second action, viz., the local irritation from the zinc powder, is, of course, particularly prominent in infancy owing to the great delicacy of their mucous membranes. The resultant partial obstruction is a natural consequence when we bear in mind the narrowness of the lumen of the respiratory passages and realize that even a small amount of swelling of the mucous membranes may cause considerable respiratory difficulty. Owing to these factors, peculiar to the infant, bronchitis and bronchopneumonia have at times occurred as complications.

The systemic effects noted in infants after zinc stearate insufflation present a fair analogy to above described zinc poisoning in adults. The local effects noted in the infants are absent in the industrial type. This is due in part to the fact that in this latter instance the trouble results usually from zinc in a gaseous form and the exposure is consequently not so prolonged. A more important factor, however, is the anatomical peculiarity of the respiratory tract in infancy. The nasal passages, larynx and bronchial tubes are lined with a very delicate mucous membrane.

The narrowness of these passages as well as their delicacy of structure renders local irritation and obstruction more likely to occur than in the case of adults. A natural consequence of such irritation and obstruction of the respiratory tract is bronchopneumonia, which followed in several of the cases reported by Heiman and Aschner.

Treatment may be divided into the immediate and the expectant. When the infant is first seen efforts should be directed toward removing from the mouth and nose as much of the powder as possible. Owing to the fact that a certain amount of the powder was recovered in the stools in some of the cases, gastric lavage should be done and a thorough catharsis should follow. By such measures the severity of the systemic effect can certainly be lessened.

Following this the treatment is symptomatic. Expectorants would seem theoretically to be of value in diluting the zinc which may have entered the bronchial tubes. In cases with dyspnoea and marked obstruction a croup tent may be used.

In the series above reported, while the symptoms were at first alarming, no case failed to show improvement in 72 hours, and none developed a bronchopneumonia, nor did any die.

That the condition is not without danger, however, is shown by reports of two fatal cases, one by Heiman and Aschner in a series of twelve cases, and the other in a case reported by Edmondson[3].

[1] Heiman and Aschner: Am. Jr. Dis. Children, June, 1922.
[2] From a personal communication.
[3] Edmondson, Wm.: Jr. A. M. A., Jan. 13, 23, 80, 105.

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MISCELLANY

HOMELESS CHILDREN

One-third of the homeless children in the United States under the care of public and private charitable agencies have found foster parents who have taken them into their own homes.

This is the estimate of the Children's Bureau of the U. S. Department of Labor which has just issued an important report on "Foster Home Care for Dependent Children." This report, compiled under the direction of the social service division of the Bureau, includes articles by 11 well known authorities on child welfare.

The growing emphasis during the past decade upon the need of home care for the normal child has resulted, the Bureau points out, in the effort, first, to prevent the break-up of the child's own home by giving "mothers' pensions" or public aid to children in their own homes, and second, to find a substitute home for the homeless child. Results are evident in the fact that 42 states give public aid to dependent children in their own homes, that the number of children in foster homes has increased substantially and that the number of children in institutions has, proportionately to the child population, decreased.

Tentative figures place the number of children aided in their own homes at 127,000, the number in foster homes at 70.000, and the number in institutions at 125,000.—*U. S. Department of Labor, Children's Bureau, Washington.*

Case Records
# of the
Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY
RICHARD C. CABOT, M.D., AND HUGH CABOT, M.D.
F. M. PAINTER, A.B., ASSISTANT EDITOR

CASE 10421

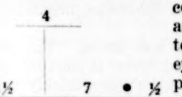
An Italian schoolgirl of fifteen entered June 10 for study.

F. H. Her mother died of unknown cause.

P. H. Negative.

P. I. June 6, when feeling perfectly well, the patient developed a cold in the head. The next morning she had right-sided headache. She came to the Throat Department of this hospital, where she was given a spray for the nose. The headache persisted. June 8 she began to have double vision, and her right eye turned in. The headache and eye became worse. She had been fairly comfortable in bed since June 7, but if she got up the headache, malaise and dizziness increased. Her relatives said she had been drowsy. She thought she had no fever. Her bowels had moved twice with catharsis.

P. E. Well nourished. Apex impulse of the *heart* not found. Measurements as shown in the diagram. No abnormalities of the heart recorded. *Lungs, abdomen,* and *genitals* normal. Internal strabismus of both eyes with apparent complete paralysis of the left external rectus and partial paralysis of the right external rectus. Double vision in both temporal fields and single vision in both nasal fields. *Pupils.* Reactions normal. *Extremities.* Slight twitching of right hand, not continuous. No abnormal *reflexes* obtained.



T. 101.5°-104.1°. *P.* 85-158. *R.* 20-40. Amount of *urine* not recorded, sp. gr. 1.012-1.030, the slightest possible trace of albumin at one of three examinations, at the first an occasional clump of leucocytes; at the second rare leucocytes and an occasional clump of 30 to 40 red blood corpuscles; culture showed a few Gram-positive bacilli in chains; at the third, a catheter specimen, an occasional clump of red blood corpuscles, culture, colon bacillus, streptococcus. A fourth specimen, centrifuged, was negative for tb. *Blood.* Hgb. 80%, leucocytes 23,200-2,800, polynuclears 91%, reds and platelets apparently normal. *Wassermann* negative. *Non-protein nitrogen* 31 mgm. per 100 c.c. *Blood sugar* 104 mgm. *Blood culture.* A slight growth of Gram-positive bacilli. *Throat culture.* Streptococci. *Lumbar punctures. June 10.* Pressure 220. Dynamics normal. After withdrawal of 12 c.c. pressure 110. Fluid clear, colorless. 227 cells, 1% polynuclears, 99% plasma cells and lymphocytes. Wassermann negative. Ammonium sulphate and alcohol strongly positive. Total protein 174. Gold solution 1123330000. No tb. *June 11.* 25 c.c. of bloody fluid. Pressures 250, 150, 145. Centrifuged specimen negative for tb. *June 14.* Colorless, very slightly turbid fluid. Pressure 290. Jugular compression 470. Return 270. Pulse and respiration oscillations normal. 210 cells, 2% polynuclears, 98% lymphocytes. Ammonium sulphate and alcohol strongly positive. Wassermann negative. Total protein 190. Gold solution 0001231100. Sugar 21. Centrifuged specimen negative for tb. *X-ray.* "Rather indefinite mottling throughout the upper part of both chests, more on the right than on the left. Some motion in the plate which makes definite diagnosis impossible. Findings should be confirmed."

Orders. June 10. Individual precautions. Soft solids. Force fluids. Morphia gr. ⅛ by mouth every four hours p.r.n. (Not given.) June 11. Castor oil ʒ i. Soapsuds enema. Paraldehyde ʒ ss, repeat once if necessary. (Not given.) Triple bromides gr. xx at 8 p. m. Chloral hydrate gr. x p.r.n. (Not given.) June 12. Triple bromides gr. xx at 8 p. m. Codein sulphate gr. ½ by mouth if noisy or disturbing to rest of ward; repeat once if necessary in three hours. June 13. Paraldehyde ʒ ss, repeat once if necessary. (Not given.)

The day after admission the left abdominal reflex and left knee-jerk were greater than the right. There was a tendency to pseudoclonus on the left. A neurological consultant reported, "There is some bilateral sixth nerve weakness now. No other cranial nerves noticed. Patient lethargic, with occasional mild delirium." June 12 no difference in the reflexes could be determined. The patient sat in bed picking at the bedclothes and would not answer any questions. June 14 she was worse if anything. The knees were stiff. She seemed not to recognize anyone and lay almost in a stupor, in no apparent pain. On the right buttock there was a reddened area about 10 cm. in diameter with a whitish border and somewhat indurated. June 16 examination showed loss of all reflexes below the neck except the right biceps. She was incontinent of urine. Kernig was present but not marked, though it caused her to wrinkle her face. She did not talk. The condition was somewhat like catatonia, except that she followed people's movements with her eyes. She was resistant to throat examination, so that it could not be determined whether or not there was any paralysis of the throat. June 18 the pulse rose rapidly and she died.

DISCUSSION

BY DR. RICHARD C. CABOT

NOTES ON THE HISTORY

A girl of fifteen with a sudden, acute, persistent headache, associated with double vision and a squint, must always be suspected to be the subject of a meningitis, which at her age is very apt to be of the tuberculous type. Besides the headache and the eye trouble, her dizziness and her drowsiness go far to support the possibility of meningitis. No other possibility occurs to me on reading the history up to the point where the physical examination begins.

NOTES ON THE PHYSICAL EXAMINATION

The physical examination, besides the ocular palsies, due apparently to involvement of the nuclei of the external rectus muscle in each eye, shows twitching of one hand, a continued and considerable fever, a urinary infection and nothing else of importance until we come to the central point, which is the lumbar puncture.

Examination of the lumbar fluid proves the presence of a chronic meningitis which at her age and in the absence of syphilitic history and of syphilitic serological reactions can, so far as I know, mean nothing but tuberculous meningitis. Other causes of a high cell count in the spinal fluid, causes such as poliomyelitis or encephalitis lethargica, would rarely produce the squint.

The X-ray record of mottling in the upper part of both chests suggests that the tuberculosis which seems to have attacked the nervous system is also active in the lungs in the form of a miliary process.

The later notes of the patient's progress in the hospital show increase of localizing brain symptoms such as a difference in reflexes and involvement of other cranial nerves. The appearance of Kernig's sign, incontinence, speechlessness, and a catatonic state add nothing of diagnostic value.

DIFFERENTIAL DIAGNOSIS

There remains a discussable suspicion that the case may be encephalitis rather than, as I believe, meningitis. But the low sugar figure in the spinal fluid, the rapid progress of the symptoms, the degree of increased cell count, point toward meningitis. The mottling of the lungs in the X-ray plate, unless explained as a complicating bronchopneumonia, also favors tuberculosis. The twitching of the right hand is not described so as to suggest the generalized choreiform movements of encephalitis. It is more like a focal symptom of meningitis. On the whole that seems to me the best diagnosis. In view of the involvement of the lungs it is more than probable that the process is a general miliary one, involving various other organs, though we have no way of telling which organs may be involved or how far.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Tuberculous meningitis.

DR. RICHARD C. CABOT'S DIAGNOSIS

Tuberculous meningitis.
Miliary tuberculosis.

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesions*

   Tuberculous meningitis.
   Tuberculosis of the bronchial, mesenteric and retroperitoneal lymph glands.
   Tuberculosis of lungs, miliary and with small caseous areas.
   Tuberculous ulcer of the intestine.
   Miliary tuberculosis of the peritoneum, liver, spleen and kidneys.

2. *Secondary or terminal lesions*

   Hemorrhagic areas of the lower lobes of the lung.
   Slight serosanguineous hydrothorax.

3. *Historical landmarks*

   Slight chronic pleuritis.

Dr. Richardson: The pia at the base, especially well marked from the upper part of the pons to the optic chiasm and out the fissures of Sylvius, and between the frontal lobes, was coated with a rather thick pale yellowish-gray layer of exudate which was a little granular in places. The vessels of Willis, sinuses and middle ears were negative. The brain tissue was rather pale and soft, but otherwise negative.

The skin was pale.

The peritoneal cavity was moist. The peritoneum showed scattered over it smaller and larger tubercles. They were very thickly sown on the peritoneal surface of the diaphragm and the peritoneum in the region of the flanks.

In the lower end of the small intestine there were several smaller and larger tuberculous ulcers.

The large intestine showed several tuberculous ulcers.

The mesenteric glands were slightly enlarged and in instances showed small caseous areas. The retroperitoneal glands in the region of the head of the pancreas and the lesser omentum were moderately enlarged and showed small caseous areas. The margin of the liver was 4 cm. below the costal border. The diaphragm was at the fourth rib on the right, and at the fifth interspace on the left.

In each pleural cavity there was about 300 c.c. of thin reddish bloody fluid. In the region of each apex there were a few slight adhesions. The trachea and bronchi contained much purplish-red frothy fluid. The mucosa was slightly reddened. The bronchial glands were considerably enlarged, up to 3 cm. They showed smaller and larger caseous areas.

In the apices of the lungs there were tubercles and minute to small caseous areas. In some of these there were minute cavities. The tissue of the lungs generally showed tubercles scattered through it, and in the region of the lower lobes there were large hemorrhagic areas which extended into the pleura, presumably the source of the bloody fluid in the pleural cavities.

There were many old reddish adhesions from the liver to the diaphragm. The liver surface showed tubercles here and there, and a few tubercles were seen in the substance of the organ. There were a few reddish adhesions from the spleen to the diaphragm. On the surface of the spleen and in its substance there were tubercles. The kidneys showed tubercles on their surfaces and in their substance. The pelves, ureters and bladder were negative.

CASE 10422

A Norwegian-American housewife of thirty-two entered March 9.

F. H. Unimportant.

P. H. Not recorded.

P. I. Six months before admission she contracted venereal disease, followed by a diffuse rash over the trunk, neck and arms. At a dispensary she was given "ten arm and six hip treatments." A Wassermann test was negative at the beginning of the treatment. She became jaundiced three months ago and the treatment was stopped. She changed at this time to a private physician who gave her "seven more arm treatments and one hip treatment." She took KI until a rash appeared a month ago, and also took mercury pills. A Wassermann was positive. The last arm treatment was a month ago, the last hip treatment three weeks ago. At this time she began to have dull headache, which had been growing worse, and the pains became very sharp. For the past four days she had been vomiting and had had violent pains on movement of the head and neck. These pains involved the ears and the distribution of the fifth nerve. Jaw movements and neck movements were also painful. She had radiating pains from the lumbar region around to the front of the abdomen. The day of admission she had stiffness and pains in the back and neck and double vision. Defecation and urination had been normal.

P. E. A thin woman, unable to turn the left eye to the left. Forehead wrinkled equally on both sides. On showing teeth the left corner of the mouth was not raised so high as the right. Neck and jaws stiff and painful to motion. Back stiff, though not painful. Tinnitus and hyperacousis. *Heart, lungs, abdomen, genitals, extremities* and *reflexes* normal. *B. P.* 110/75. *Pupils* reacted to light but only slightly to distance.

T. not remarkable except for one rise to 100.1° March 31 (cisternal puncture.) *P.* 63-120. *R.* normal. Amount of *urine* not recorded, sp. gr. 1.010-1.020, cloudy at one of five examinations, alkaline at one of seven, albumin at two of nine, a few to many leucocytes at two. *Blood* not recorded. *Spinal fluid.* See table. *Neurological consultation* March 9. Fundi showed marked optic neuritis, right, with small hemorrhages and exudate. No elevation of disc made out. Fields roughly normal, and patient could read ordinary type. "Should watch eyes carefully and treat as intensively as possible."

At the lumbar puncture the day of admission the fluid did not spurt from the needle, but when the manometer was attached the fluid overflowed the manometer, i. e., more than 530 mm. Following the lumbar puncture the patient was relieved almost instantly of the headache, although the pains in the neck continued when she moved. The eye was covered to relieve double vision. She was slightly irrational, perhaps from the quarter grain of morphia given previously for the pain.

March 10 20 c.c. of diarsenolized serum was given, followed by 10 c.c. of saline instilled very slowly. This raised the pressure to 600 mm. At this point the patient noted a slight return of the headache. The withdrawal of 5 c.c. reduced the pressure to slightly over 500, and the patient felt well, so the needle was withdrawn. She passed a rather bad night, but slept well toward morning. The next day the headache, the pains in the neck and back, and the stiffness of the neck were less severe and she felt much better. March 12 an oculist found optic neuritis of both eyes. In the right eye there was a small retinal hemorrhage above, at the periphery. In the left eye there was a large patch of pigment temporally. He reported, "Paresis of external rectus; otherwise eyes essentially negative." A neurologist reported March 13, "Right facial paralysis increased, now almost complete. Left third and sixth palsies the same. Some nystagmus looking to right, a new sign to me. Believe there is increase in symptoms."

March 13 the right side of the face and forehead was smooth and unwrinkled. The left side of the forehead did not wrinkle. She had difficulty in opening and closing the left side of the mouth. At the spinal puncture done that day the initial pressure varied rhythmically though quite slowly (every thirty seconds) between 430 mm. and 530 mm. The withdrawal of 8 c.c. reduced the pressure to 260 mm., where it varied rhythmically between 260 and 160. Jugular compression increased this 100 mm. After withdrawal of 8 c.c. more the pressure varied between 40 and 70. Jugular compression increased it 50 mm. Respiratory excursion was 20 mm. to 10 mm., depending on whether the pressure was increasing or decreasing at the time. Heart beat was very evident, 2 mm. Psychic states had a profound influence upon the pressure. Worry or fear raised it as much as 100 mm. The fluid was quite clear. Relief was afforded by the withdrawal of 16 c.c. No change in the symptoms occurred.

March 16 the patient showed an increasing degree of paralysis of the third and sixth facial nerves, and had severe headache. The next day she was somewhat better, though still unable to close the right eye completely. The right side of the mouth drooped considerably. The facial muscles showed increased tonus, and wrinkling had reappeared. A blood Wassermann was strongly positive.

At the lumbar puncture on this day there was no swinging of the initial or final pressure, but after the removal of the first 10 c.c. of fluid there was rhythmical swinging from 170 to 200 and occasionally as low as 90.

March 18 the right pupil was dilated, one-third greater than the left. The pupillary reflexes were slow in action. The right eyelid did not close completely, and the eyeball rolled upward and outward when the attempt was made. There was rhythmical swing from 280 to 320 mm. Jugular pressure from 280 increased to 370 mm. Psychic influences were marked. There was herpes over the right cheek and corner of the mouth. March 20 the facial expression was better and the patient could almost completely close the right eye. March 21 there was herpes over the neck and forehead. Improvement was not evident.

LUMBAR AND CISTERNAL PUNCTURES

	Physical characteristics	Initial pressure	Cells				Protein			Wassermann	Goldsol	Culture	Sugar	Serum injected
			Total	Differential			Alcohol precip.	Ammonium sulphate ring.	Sulpho-salicylic acid. Mgm. per 100 c.c.					
				Polys.	Lymphos.	Large monos.								
Lumbar punctures.														
Mar. 9	Clear yellowish	530+	267	0	97	3	++	+	250	Strongly +	0000000000			
Mar. 10		700										No growth		20 c.c.
Mar. 13	Clear colorless	530	230	5	89	6	+	+	235	Strongly +	0001221000			
Mar. 16	Clear colorless	220	750				+++	+	182	S trongly +	0112100000		.0416%	
Mar. 18	Clear colorless	280	174				+++	++	182	Strongly +	0112100000			10 c.c.
Cisternal punctures.														
Mar. 22	Clear colorless	300	80		+		+	++	93	Strongly +	0011000000			21 c.c.
Mar. 29	Clear colorless	200	40		+		+	+	48	Strongly +	0011000000			17 c.c.
Mar. 31	Clear colorless	180	31		+		+	+	57	Strongly +	0012210000			25 c.c.
Apl. 4	Clear colorless		15		+	+	+	+	44	Strongly +	0000000000		.0465%	15c.c.
Apl. 7		200	14		+		Sl. +	Sl. +	40	Strongly +	0011000000		.0471%	15 c.c.
Sept. 13		195	3				Normal	0	26	Moderately +	0000000000		.0500%	
Aug. 5	Clear colorless	190	48				+	+	50	Strongly +	0000000000			

March 22 the headache was still severe and unchecked by bromides or sedatives. The patient was thought to be a bad risk for morphia and codein. She complained of pain, always worse at night. At this time it was decided that serum should be given by the cisternal route. There was prompt improvement in the condition. The herpes diminished. There was still extensive weakness of the facial muscles. The external rectus of both eyes was weak, but the patient was able to see and read with comfort for a short time. She was mentally clearer. Sodium bicarbonate at midnight acted well as a sedative. The headache was less severe. By March 25 she was sitting up and was active and cheerful. Weakness in the facial and ocular muscles was still pronounced. Next day there was rather diffuse small vesicular rash over the forehead and face. Potassium iodid was decreased. The headaches were beginning again and the patient felt somewhat worse. The herpes was about the same. March 27 she had improved mentally. The sensory fifth nerve was better, but the motor fifth not improved. The sixth and fourth were weak. The rash was slightly decreased. The headache disappeared after the puncture. The morning after the puncture there was slight headache. March 27 and April 4 the headache was relieved after the puncture, but April 7 there was severe frontal headache following treatment, better after the patient had been sitting up a while. X-ray of the sinuses was negative. April 8 the patient was discharged much relieved to the Out-Patient Department. Electrical examination showed no reaction of the right facial muscles to faradism.

She did not report again until September 5, when she said she had been having some "electric treatment," and that she had been quite well. The pupils reacted sluggishly. The left knee-jerk was hyperactive. There was slight swaying in Romberg's position. A blood Wassermann was strongly positive. September 12 she had no headache and no symptoms. The fundi were normal. There were no signs of the old optic neuritis. Vision, left eye 20/30, right eye 20/30. Pupils equal, circular, reacted to light and accommodation. There was no ocular motor palsy and no nystagmus. The right facial muscles were slightly weaker than the left. Knee-jerks and ankle-jerks were equal and normal. She was able to walk a line. There was no ataxia of the hands. A lumbar puncture was done on this day. The fluid showed a moderately positive Wassermann, but was otherwise quite normal (see table). A mild course of intravenous diarsenol was ordered, but was not followed by the patient.

Discussion

BY DR. JAMES B. AYER

This case illustrates a somehat unusual and extremely severe type of neurosyphilis occurring during the secondary stage of luetic infection, and brings up for discussion the proper methods of treatment for an acute meningitic syphilis.

From the history it is apparent that she received proper and adequate treatment at an early stage in the syphilitic infection, and while under this treatment she developed a neurorelapse. As has been seen in the history of the case, arsphenamin had been used to the point of producing jaundice, iodid to the point of rash, and mercury to the point of ptyalism, and at this stage she is violently sick with meningitis and rapidly becoming worse. Obviously more treatment of the same character is contraindicated; so we turned, in her case, to serum therapy. At first this was given by the lumbar route. Certain symptoms yielded to this type of treatment, notably the headache, on simple release of a given amount of fluid. There was a certain improvement in serology, as seen in the accompanying chart, but not so marked an improvement as was hoped for. After nine days of such therapy, with certain symptoms not at all relieved and certain cranial nerve involvement more pronounced, it was determined to try the effect of serum administered by the cisternal route, with the hope that more of the serum would reach the base of the brain, which from the clinical point of view and from correlation with necropsy findings we know to be the location of the meningeal infection in syphilis. Since we could not give her intravenous therapy, the serum employed was a pooled serum obtained from other patients being treated by intravenous arsphenamin. The technique is that of the original Swift-Ellis method, with the exception that we now give the serum into the cisterna magna instead of into the lumbar sac. Marked improvement was noted the day following the first injection by this method and continued almost uninterruptedly throughout the course of five injections. So striking was the improvement both in the clinical picture and in the serology that there could be little doubt as to the part played by this type of treatment in this patient.

It is not usual that such severe measures are necessary in the meningitic type of syphilis. I have seen similar patients yield to intravenous therapy, but in this particular patient it was necessary to employ all forms of treatment at our disposal before satisfactory amelioration of symptoms and signs was obtainable. It is probable that ventricular injections of the same serum would have brought about a similar result, in that this serum would have gone immediately to the cisterna magna and have been distributed to the base and over the convexities, as is the case with cisternal injections. However, it seemed to us best to employ the cisternal route, because for this no operative procedure was necessary, as is the case with ventricular puncture.

We do not know whether this patient is cured or not. It is probable that she is not, and we have asked her to take a moderate amount of treatment beginning with small doses of arsphenamin intravenously and to let us follow her. She has not thus far done so.

LATER NOTES

The patient was seen again August 5. There were no symptoms except occasional headache. No abnormality in the cranial nerves was noted. A blood Wassermann was weakly positive.

September 22 the patient reported on urgent request of the physician. She said that she had had no symptoms. Examination showed the vision 20/20 in both eyes, with normal fundi; no extraocular palsy. The pupils reacted normally. There was a slight residual right facial palsy, about the same as on the previous examination. The tendon reflexes were all normal; Romberg absent. The urine showed a very slight trace of albumin as the sole abnormality.

In view of the persistent positive tests further treatment was advised in spite of the fact that there were no clinical symptoms of active syphilis.

DIAGNOSIS

Syphilitic meningitis (base of the brain).

CASE 10423

First entry. A twelve-year-old American schoolboy entered February 21 for relief of convulsive seizures.

F. H. His mother was very "nervous." Her sister and father were epileptic. She had two other children, neither of whom had ever had convulsions.

Habits. No tea or coffee.

P. H. During early boyhood he had measles, whooping cough and scarlet fever. At seven years he had enlarged tonsils and recurrent tonsillitis, stopping when his tonsils were taken out. At seven he fell from a banking, landing on his feet and spraining his right ankle.

P. I. When he was seven years old, some time after the fall mentioned above, his father noticed that the boy complained several times a day of cramp in his right arm. During these attacks the arm was not drawn up but remained flaccid. After several weeks these "cramps" became more severe. At each attack he would seize the right wrist with his other hand and hold it tight. There was not as yet any element of contraction in the attack. Only the right arm was involved and there were no general symptoms. He was taken to a hospital, where study and X-ray examination were made. The attacks suddenly ceased and the boy was not taken back to the hospital. He remained perfectly well for a year and three months. Then the attacks began as before. Under osteopathic treatment the attacks became much worse. The right arm was tightly flexed during the attack. A few weeks later the right leg became involved and the jaw tightened with each attack so that he could not speak. These seizures lasted only a few seconds. He would fall to the floor because the right leg became tightly flexed. He always fell so that he did not bump himself. During the attacks he was conscious, could see and hear what was going on and remembered it afterward, but could not talk. He never bit his tongue, frothed at the mouth or twitched. He was warned of the coming on of an attack by a peculiar "shock-like" feeling in the right arm. The instant that the attack was over he would get up and go about his play or study as before. There was no succeeding drowsiness, weakness, paralysis, etc. He continued to have three or four such seizures every day and four or five at night. During the night he would give a slight groan when the attack began, but did not waken. During the day attacks he did not cry out. After four or five weeks of unsuccessful osteopathic treatment the father turned to Christian Science. After several weeks of this therapy the boy began to improve and soon recovered completely from the seizures. He remained well for over a year. Then in March, eleven months before admission, the seizures returned with their former severity and continued at the rate of three or four a day until summer. Then he had no more during the day, but continued to have two or three in the night. In September they became more frequent and had persisted so. Within the past few months his father had noticed that both arms were involved, the left only slightly. There was also some blinking during the attacks, and the boy became flushed. On Christmas day he had a convulsion lasting ten minutes, during which he was completely unconscious, voided (?), became deathly pale, and twitched all over. The following day he had another similar convulsion. He had never had headache or nausea and had not vomited except for one day eight months ago, when he vomited several times and had a slight headache. He played normally with other children, was not particularly difficult to discipline, and got on well in school. The attacks seemed to come on with excitement, during thunderstorms, visits to the doctor, etc.

P. E. Head, throat, *heart, lungs* and *abdomen* negative. Lower pole of right kidney palpable. *Pupils* dilated. Reactions to light and distance very active. Field of vision normal to rough tests. *Fundi.* Disc outline sharply defined. Vessels appeared abnormally tortuous, especially in the left eye. Small vessels stood out. Whole fundus looked pinker than usual and mottled. *Reflexes.* Knee-jerks and ankle-jerks equal and active. No clonus, Babinski or Gordon. Oppenheim indefinite. Chaddock negative. Arm reflexes sluggish, equal. Right cremasteric present. Left testicle undescended. Romberg negative. Abdominals not obtained. Finger to nose and heel to knee tests well done. Sensation to touch and pain normal. Position sense normal. Ability to recognize size and shape of objects normal. Gait normal.

T. 97°-99°. *P.* 80-100. *R.* normal. *Urine* normal. *Blood* normal except leucocytes 13,000. *Wassermann* negative. *X-rays. February 26.* No definite abnormality in the bones of the cranium. Sella apparently normal in size and outline. Bones of base of skull showed no definite variation from normal. About 3 cm. above the sella was a small irregular shadow, probably a small area of calcification, which was clearly visible in the plates taken on the right side but was not seen in the plates taken on the left, suggesting that it was very close to the skull on the right side and might be a small area of calcification in the meninges. No definite abnormality in the depth or tortuosity of the vascular grooves on the inner table of the skull. A suggestion of increased distinctness of the convolutional markings on the inner table, though not marked. This might be due to a moderate degree of intracranial pressure. *March 3.* Findings agreed with the previous report.

Orders. February 26. Luminal tablets gr. iss, one-half tablet at bedtime.

Two nights after admission the patient had convulsions at 8:30, 11:15, 11:45, with slight twitchings of the head and arms and slight outcry. At twelve he had a more severe convulsion lasting about three minutes in which he threw his arms about and his body twitched and then became rigid. At one o'clock he had a convulsion in which the movements of the body and extremities were so severe that he had to be held in bed. He went back to sleep immediately after each convulsion and slept well. The following day he did not remember much about the convulsions of the night. That day a spasm was observed. While he was lying on the bed he suddenly looked frightened, gave a strange little cry, and seized his right wrist with his left hand. His face became flushed, his right leg extended stiffly to the side, his right arm drawn up. There were no clonic spasms or frothing at the mouth, and he was conscious all the time. He cried a little afterwards, then got up and was normal. That night he had five convulsions similar to those of the night before, none severe. He gave a little cry, looked frightened, first became rigid, then twitched. His eyes were fixed. His father said that the boy voided during some attacks about a year ago, but was sure he had not done so for several months. The attacks were at their worst a year ago, when he had twenty or thirty a night and at frequent intervals during the day. In the attacks during sleep the right arm was flexed and trembled a little, the right leg was extended stiffly, and at times the left arm was a little flexed and stiff. The boy had always been rather irritable. He had not had any bad frights except during a thunderstorm eight months ago, when he was "hysterical," crying a good deal, and after this had a convulsion. Before this he had been free from convulsions for two months. Afterwards he began to have them again regularly.

The night after his first dose of luminal he had only three convulsions, which were less severe than those of previous nights, when he had had five to eight. The following night he had five mild convulsions.

Dr. Ayer noted, "We have apparently certain evidence of increased intracranial pressure in the X-rays of the skull. In that we have no present symptoms of intracranial pressure increase clinically or spinal fluid pressure it would seem that the X-rays show evidence of past pathology. If medical treatment unsuccessful should return for possible surgical investigation."

March 3 the patient was discharged to the Out-Patient Department to continue luminal therapy.

History of interval. For the past few months he had had definite attacks of convulsive seizures in addition to the other type of attack coming on at night and lasting six to seven minutes, during which he lost consciousness. At readmission he had on an average six to eight daily attacks and one at night.

Second entry, January 13.

P. E. (As before except as noted.) A moderately well developed and nourished boy, very intelligent and imaginative, distinctly not the picture of mental deterioration. No pupillary, sensory or reflex changes demonstrable. Moderately marked vasomotor irritability. Nares small, poor airway. Spine not flexible; lordosis. Examination otherwise negative. *B. P.* January 26 142/84, January 31 108/78.
T. 97°-99.4°. *P.* 70-126. *R.* not remarkable. *Urine.* ℥ 33-100, sp. gr. 1.020-1.034, alkaline at one of three examinations. *Blood.* Hgb. 70%-85%, leucocytes 9,000-10,800, polynuclears 64-70%, reds 4,284,000-5,048,000. *Wassermann* negative. *Pirquet* very mildly positive. *X-ray January 18.* No evidence of intracranial abnormality. Sella normal in size and outline. The small shadow noted in the previous examination on the right side was not visible in these plates. . . . Stomach and esophagus normal. Delay in emptying at junction of second and third portions of duodenum. Its position was normal. No tenderness over this region. Head of meal in cecum at six hours. Cause of the delay at the junction of the second and third portions of the duodenum not determined. Delay not due to obstruction. *February 9.* Plate of chest showed rather large lung field with low diaphragm, otherwise negative. Marked limitation in inspiratory motion. Moderate expiratory movement. *Throat consultation.* No reason to suspect the small tonsillar remains as a focus of infection. *Orthopedic consultation.* Dorsal spine rounded and very stiff to extension. Flat type of chest with flaring rib margins. Costal angle moderately narrowed (one finger breadth) and very long. Colon and cecum both quite palpable and gave a feeling of considerabe congestion—gave a suggestion of some fecal material in colon. Flabby abdominal musculature. To have extension t.i.d., half an hour on back and half an hour on belly.

Orders. January 16. Weighed diet, protein 60, fat and carbohydrates up to 2200 calories. Diet to be fairly constant and protein intake to be constant. January 25. (Orders for urine collection and very accurate measurement of urine and fluid intake.) To stay in bed. Lie over pillow one half hour on back with pillow between scapular angle and lower ribs, then one half hour on face with pillow between lower ribs and five inches below crest of ilium. January 26. Force fluids to ℥ lx in twenty-four hours. Reduce period lying on abdomen to twenty minutes t.i.d. January 28. No food starting tomorrow morning. Must take minimum of sixty ounces, better eighty ounces, water. Rectal irrigation every p. m. Soapsuds enema every a. m. February 7. Orange juice with one level tablespoonful lactose per glass, ½ ounce every fifteen minutes for three doses, then one ounce every fifteen minutes for three doses, then two ounces every twenty to thirty minutes. Cereal and jelly at 1 p. m. ℥ ss. At 4:30 malted milk ʒ i to water ℥ i poured over cream of wheat ℥ ii. May also have malted milk to drink. Cracker and jelly if desired. May have orange in half an hour. February 8. Breakfast, cereal, two slices well-done toast with jelly, fat free milk, baked apple or apple sauce. Luncheon, small portion of chicken, vegetable purée (no potato), fat free milk, toast, fruit. February 9. Soft solids with fat free milk. Take pulse while asleep twice during night.

The boy had numerous convulsions, almost entirely at night. For the first five days he seemed perfectly normal between the attacks, though he was somewhat emotional and high-strung and cried easily. His general physical examination was nearly entirely negative. Nose and throat consultations and consultations for refraction and fundus examination were all negative. On January 26 a very severe convulsion was observed. It was at first tonic, then clonic spasms of arms, legs and face, rather more marked on the left side. The eyes were widely dilated during the clonic stage. The breathing was very stertorous. A violent convulsion was followed by sudden relaxation. The boy was immediately conscious, cried, then said he was all right and smiled. He described the movements about him during the convulsion and seemed to have been perfectly conscious all the time.

During the fast, which was begun January 29, the boy complained little of hunger. The first afternoon there was a slight flush of acidosis. January 31 he was unhappy and emotional. The pulse was slow and slightly irregular, the blood pressure 108/78. He was slightly flushed but not strikingly acidotic that day and the next. February 1 the pulse was more regular. He cried easily, and seemed depressed. February 2 he complained much of hunger. He was moderately acidotic. Enemas were fecal stained; no formed stools. The Scott-Wilson test showed the breath acetone diminished since morning. There was great suspicion that he had been given a small amount of sugar, although he vigorously denied this. February 4 he looked clearer and less acidotic and was less apprehensive than before. For the next two days he was much better, looked less acidotic and could have maintained the fast longer than had been contemplated. February 6 the general condition was good. He was mildly acidotic clinically. Enemas continued fecal stained.

February 7, when the fast was broken (see orders), he quickly lost his acidotic appearance. Throughout the fast there had not been the usual improvement in condition. On the contrary, he had had more attacks during the fast than before the hospital entry, and was free from them only February 6, the ninth day of the fast. Many of the nocturnal attacks had been very severe and convulsive in character. He had continued postural exercise—rest in hyperextended position—during the fast. February 9 a cast was applied. He complained of a great deal of discomfort during the night and had many attacks. At his discharge February 12 it was felt that there had been no demonstrable improvement from the fast, but it was hoped that later more improvement might be manifest.

DISCUSSION

BY DR. FRITZ B. TALBOT AND DR. LLOYD T. BROWN

NOTES ON THE HISTORY

DR. TALBOT: This child remained comparatively well until he was seven years old, when he had the first attacks which might be considered epileptiform. As time went on the convulsive movements became more generalized. He did not bite his tongue. He lacked the characteristic drowsiness which usually follows an attack. Careful physical examination gave no clue as to the cause of these attacks.

NOTES ON THE PHYSICAL EXAMINATION

Syphilis was ruled out by a negative Wassermann. The only suggestive feature of the X-ray examination was a small irregular shadow which might have been a small area of calcification in the meninges.

DIFFERENTIAL DIAGNOSIS

This boy had characteristic attacks of what is known as idiopathic epilepsy, that is, epilepsy of unknown cause. There was ~~no history of~~ a fall or a blow ~~suggesting~~ a surgical cause of the condition. The only indication of such an etiology is the indistinct shadow shown by the X-ray of the skull. It was therefore our duty to study and rule out all other causes for the attacks before concluding that this had any connection with the convulsions.

The first thing was to rule out any error in refraction of the eyes. It has been found that in some instances correction of errors of refraction has stopped such attacks. Secondly, reflex irritation from teeth had to be ruled out. There was found to be no connection between the teeth and the attacks. Thirdly, the relationship between the attacks and the gastro-intestinal canal was investigated. The bismuth X-ray did not show sufficient abnormality of the intestines to explain the attacks. It was however seen that his posture was poor, and measures were taken to correct this mechanically by a plaster cast and by exercises designed to build up the weak muscles. This did not affect the attacks at all while the boy was in the hospital.

Finally he was made to fast for a period of ten days. The purpose of the fast is to induce a relative acidosis. An acidosis always appears during complete fasting. There is said to be a relative alkalosis just preceding the attacks, indicating that there may be some relationship between the alkalinity of the blood and the attack, and it has been thought by many investigators that if the blood could be made more acid the attacks might be prevented. It has been observed in this clinic that the epileptiform attacks diminish in number and usually disappear about the time that acidosis appears. In this child, however, the clinical results were not so definite as had been observed in other children who underwent the same treatment. Ordinarily the epileptiform attacks disappear entirely on the third or fourth day of fasting and remain absent for some time after the fast is broken. It has been observed in many instances that after a period of fasting the attacks are less severe and less frequent than before the fast. In no instance however have the results warranted the conclusion that fasting permanently cures epilepsy.

If a fast is undertaken for this purpose it always must be borne in mind that very severe symptoms of acidosis may result and that it is very important to see that the patient receives large amounts of fluid to eliminate through the kidneys the acids formed. If less than sixty ounces be given to a child of eight or nine years enough acid may accumulate in the body to cause very severe symptoms. Instances are known where death has resulted from fasts which have not been properly controlled in a hospital. The acidosis which appears in these cases has been shown to be due to a lack of available sugar in the body, the sugar being necessary for the complete combustion of fat, and if it is not present in large enough amounts to maintain the antiketogenic balance then ketone acids will accumulate in large amounts.

The medicinal treatment of epilepsy depends upon the use of bromides and luminal. Triple bromides, 5 to 15 grains twice or three times a day, might be used to diminish the nervous irritability. Luminal in doses from ¼ to one or two grains a day has also been used for the same purpose. The latter is not without danger. Certain patients seem to have an idiosyncrasy for it. In one instance which came under my observation it made the child wild and almost impossible to handle. In another instance it caused very deep sleep from which the patient could not be aroused for forty-eight hours. Numerous cases of so-called idiopathic epilepsy appear in the literature with much improvement, sometimes from one method of treatment and sometimes from another. Consequently it seems only fair to the patient to investigate all the possible causes, and to correct any defects found, no matter how trivial they seem to be.

Dr. Brown: The patient was of the thin, anatomic type, very emotional, very much interested in and somewhat afraid of everything that was done in the line of examination. His general body mechanics was one of very complete relaxation; he had a long chest with the ribs rather straight downward. The ribs were somewhat stiff to full expansion. The dorsal spine was moderately rounded, the curve extending to the third or fourth lumbar. This curve also did not flatten out in hyperextension, there being definite rigidity in this motion. Breathing in the standing position was very shallow. Lying down abdominal examination showed no resistance and no retroperitoneal fat in the costovertebral angles. In the knee-hand position there were definite depressions in the costovertebral angle, showing the lack of muscle in this region.

Because of the extremely faulty body mechanics it was considered wise to begin the hyperextension and postural treatment. After his fast he was to have a jacket applied in hyperextension, which was to be worn day and night, especially at night, because most of his attacks had been either in the early morning just before getting up or during the night.

He reported to the Posture Clinic during March and April, and on the 10th of May had a new cast applied because he had outgrown the other one. On May 24 the father said the boy was having no convulsions and that the mild attacks were occurring less often than before. From the point of view of the postural treatment he was not able to correct his body mechanics as it was hoped he would at this time.

On June 21 he was having slight attacks every two or three days, but these occurred only at night. He had been taken out of his jacket during the day at the end of April and was given a spring-back brace with an anterior pad. This did not hold him so well as the jacket. The importance of rest in the proper positions was most carefully emphasized.

The general condition when he was last seen in the Posture Clinic was distinctly better than when he was first seen. He was less emotional, his eyes were brighter and did not stare so much as before. The father said he felt that since carrying out the directions for rest periods and using the jacket and the brace the boy had been better, and the luminal, which up to beginning the mechanical treatment was having little or no effect, was being given with very definite results.

DIAGNOSIS

Epilepsy.

THE BOSTON

Medical and Surgical Journal

Established in 1828

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A NEGLECTED FEATURE OF MEDICAL EDUCATION

There is need for the instruction of men about to become practitioners of medicine in the methods of applying their hard-earned knowledge. Of two men equally grounded in medical lore, one will vastly outstrip the other in his ability to hold patients, and to get results. Part of his success will be due to natural powers—to personal magnetism, sympathy, and a shrewdness in judging character. Many a successful career, judging success from the standpoint of income, has indeed been based largely on these qualities, and only too little on scientific equipment.

There are, however, certain limits within which it is eminently proper to develop the influence of one's personal characteristics in regard to their effect upon patients. If one is convinced that his technical opinion represents the best in medical thought, he is justified in resorting to that method of approach which will most surely convince the patient of the desirability of accepting his advice. In the accomplshment of this, certain psychological principles may be invoked, and these principles, this technic of relationship between doctor and patient, should be taught to medical students. It is obvious that personality cannot be imparted by means of lectures, nor is it desirable that men should be advised to assume characteristics which they really do not possess. All men who enter the profession of medicine, however, can try to acquire that attitude which will command thir patients' respect and confidence. The value of listening attentively to the patient, of "hearing him out," might be emphasized. A direct, dignified manner of meeting people, freedom from mannerisms, and attention to the case in question, are factors in inspiring the patient with confidence. He wishes to consult a man, not a fop, a buffoon, or a social leader. The importance of a physical examination thorough enough to cover at least that portion of the anatomy involved, and the desirability of letting the patient know that all tests which may be indicated are being done, should be pointed out to the young student. He should be made to remember that in advising extra tests, it is always better to err on the side of advising too much rather than too little. Patients will forgive and forget an unnecessary test; they neither forgive nor forget the medical advisor whose neglect to provide for such a test allowed some serious condition to develop.

The student might well be instructed also in the proper way to lay his opinion before the person who consults him. A clear statement of the facts which his examination disclosed, couched in understandable language, should precede the presentation of his advice, the logic of which should be obvious to a lay mind.

It is not our intention, nor are we able, to treat this subject fully in these columns. The points mentioned are given merely to indicate the direction which such instruction might take. As things are now, students absorb a certain amount of this "art of medicine" from their instructors, but whether they apply it or not depends largely upon their appreciation of its value.

The books intended to convey advice to young physicians have been far from adequate, so far as we have seen them. They emphasize the external trappings, and advise a conscious development of characteristics intended to impress the patient, whereas they should stress those fundamental qualities—sincerity, a sense of responsibility and scientific honesty.

RELIABLE BIOLOGICAL STAINS

Since the use of vegetable fibres for textiles and the demand for fast and varied colors forced the art of dyeing into the hands of a specialized industrial group, the chemistry of dyes has become steadily more complicated. At the same time, the use of dyes has widened from the coloring of fabrics to such remote fields as the selective staining of bacteria and the determination of hydrogenion concentration.

The physician, especially if engaged in laboratory or research work, is peculiarly dependent on the chemist in the field of diagnosis as well as that of therapeusis. The microscope stands ready to reveal to us organisms and cells, but without some means of increasing the visibility of their structure, mere magnification is of no service. Imagine searching over smear after smear of throat cultures for the diphtheria bacillus without a stain for polar granules to help, or trying to do a differential count on a smear of fresh blood.

The development of biological staining methods has not been rapid, but has followed behind that of the dye industry. Before Perkin's discovery of the aniline colors, biologists were content with carmine, cochineal, hematoxylin, and madder, with the acid of a few mordanting solutions, the chief ingredient of which was alum. About sixty years ago Robert Koch applied to the staining of bacteria the aniline dyes which had been in use for textile dyeing for a considerable time.

But it soon was found that the ordinary dyes suited for textiles were far too variable for biological use. Since the market for biological stains was not large enough to encourage any manufacturers to attempt to supply reliable dyes, a small firm in Germany grew up which bought large lots of dyes and subjected them to various tests. The lots found satisfactory were used to supply the demand from laboratories. This was the condition of affairs when the World War broke out. We all remember what happened to the dye industry then—how even textile dyes ran or faded.

The substitutes produced in this country were far from reliable. In order to relieve the situation, and if possible prevent its occurrence, the Commission on Standardization of Biological Stains was brought into being.

At present the Commission is handling only a few stains, which are rigorously tested in the laboratories of members of the Commission. If found satisfactory, the lots from which the samples come are sold under labels showing the endorsement of the Commission.

It is to be hoped that laboratory workers will learn to look for these tested dyes. The results thus far have been very encouraging, and when the present plans of the Commission materialize, biological dyes will be even more dependable than before the War.

AN INTERESTING FEATURE OF THE CANDIDACY OF THE HON. ABBOTT B. RICE OF NEWTON

We herewith present a copy of a document distributed during the recent campaign for the nomination of a candidate for the State Senate from the first Middlesex district:

> MEDICAL LIBERTY LEAGUE, INC.
> Boston, Mass.
>
> *Dear Friend:*
>
> Hon. Abbott B. Rice of Newton is a candidate for renomination and election to the Senate from the first Middlesex district, comprising Ashland, Framingham, Holliston, Hopkinton, Natick, Newton, Sherburne and Weston.
>
> Senator Rice is opposed for nomination in the Republican primaries to be held Tuesday, September 9, by Dr. Edward Mellus, who is also of Newton.
>
> It has been reported to us that Dr. Mellus has been put forward as a candidate in the hope of defeating Senator Rice because of the fact that Senator Rice has always supported measures sponsored by the Medical Liberty League, particularly for the modification of the compulsory vaccination act.
>
> Aside from the fact that Senator Rice has been a consistent friend of Medical Liberty, he has eminent qualifications for the office he seeks. Both in the Senate and House he has ably represented his constituents, and he is in high standing in Boston as a business man.
>
> It is hoped that you will not let this opportunity pass of helping to secure the nomination and election of a tried friend of Medical Liberty.
>
> Sincerely yours,
> MEDICAL LIBERTY LEAGUE, INC.

It has been claimed for Mr. Rice that he has been friendly to the medical profession and to public health measures. The enemies of some of the most important public health measures have adopted Mr. Rice. The Medical Liberty League entered into his contest for reëlection. In its circular the assertion is made that Mr. Rice has always supported measures sponsored by the Medical Liberty League. The Medical Liberty League is opposed to compulsory vaccination, to the Schick Test, toxin-antitoxin immunization, and almost everything which the majority of the medical profession advises.

We regret to note that Dr. Edward O. Otis was quoted as a supporter of Mr. Rice, but we are informed that Dr. Otis has partially repudiated some of the inferences made from his letter of endorsement.

As noted in this JOURNAL, we are not for or against Mr. Rice as a representative of a political party, but the claim made by the Medical Liberty League raises the question whether a person who believes in the prevention of dangerous diseases can conscientiously vote for a man who would open the gates to smallpox or try to break down the best known barriers erected against diphtheria.

Men in the Legislature often have the lives of our citizens in their keeping. Those who are fighting disease cannot be indifferent to the influence of the opponents of public health measures.

HEALTH RULES FOR SUMMER CAMPS

A COMMON and growing custom exists in sending children to summer camps. The benefits to be derived are recognized provided that due regard for rules of health is observed.

Instances of bad sanitation in or about these resorts are matters of record although, fortunately, not very common. Most people in charge of these organizations are conversant with the ordinary danger of bad drainage, but since a degree of scientific knowledge is necessary in dealing with other sanitary problems and individual health, it would be wise for the parents of children to be assured of the approval of the health officials of the state where camps are located. In addition to the purity of water supplies and efficient means for the disposal of waste, it is of great importance that all children visiting these camps should be free from communicable diseases. It has long been recognized that the communicable diseases of childhood often become more prevalent with the opening of public schools, in other words, the segregation of children may introduce the possibility of illness.

All up-to-date private schools now require evidence of good health and freedom from exposure to communicable diseases for a reasonable time before the entrance of pupils. Camps should be equally careful, especialy if no physician is in attendance. Many people arrange for the summer program of children early in the year and the record and the actual conditions of a camp should be above suspicion.

New York City through its Health Department is paying attention to the problems of summer camps and has adopted a section of the code which reads as follows: "Section 217-A. Summer Camps Outside of the Limits of the City of New York.—All agencies in the City of New York sending children out of town to camps on vacations for periods of more than one day shall register with the Health Department of the City of New York through an authorized executive of such agency."

Although there was some opposition at first the Department of Health finds ready coöperation on the part of camp officials. In 1924 there were 116 camps caring for 62,826 children registered with the Department.

It is obvious that the City Department cannot enforce regulations outside of the corporate limits, but diplomacy has accomplished a great deal and state departments can employ drastic measures when indicated.

SUBSTITUTES FOR HEROIN

Physicians who were accustomed to prescribe heroin, until Congress saw fit to place a ban upon its importation and manufacture, are inquiring what drugs can be prescribed in its place. It should be remembered in this connection that a very large proportion of the profession were never convinced that heroin really met any need that could not be filled by morphine in some conditions and by codein in others. Of course, these drugs remain available and we are reminded that there is another drug of this class—ethylmorphine, also known as dionin—which may be used in similar conditions; this drug is closely related to codein—codein being methylmorphine, whereas dionin is ethylmorphine. The action of ethylmorphine is in general intermediate between that of morphine and codein, but it is claimed that it resembles the latter in being comparatively free of habit forming tendencies.

MISCELLANY

TRUTH ABOUT MEDICINES

NEW AND NONOFFICIAL REMEDIES

MEDICINAL DYES.—The dyes which are used in medicine may be divided into five classes: (1) the azo dyes, of which scarlet red medicinal and scarlet red sulphonate are described in New and Nonofficial Remedies; (2) the acriflavine dyes, such as acriflavine, neutral acriflavine and proflavine; (3) the fluorescine dyes, usually combined with metal mercury such as mercurochrome—220 soluble and flumerin; (4) the triphenolmethane or rosaniline series, such as gentian violet, crystal violet, methyl violet and fuchsin, and (5) miscellaneous dyes, such as methylene blue, phenolsulphonephthalein and tetrabromphenolphthalein. In order to obtain comparable results when employed clinically, dyes should be of constant composition. The triphenolmethane (rosaniline) dyes include fuchsin and the closely related violet dyes, gentian violet, crystal violet and methyl violet. Of these, gentian violet is the one that has been used chiefly in medicine. It is stated to have the property of great penetration; to be bactericidal also bacteriostatic in vivo toward selective organisms. Its chief use has been in the treatment of infections of the pleural cavity and of the joints. The intravenous use of gentian violet has also been proposed in staphylococcus septicemia, chronic cystitis, osteomyelitis.

Gentian violet medicinal.—A mixture of pentamethylpararosaniline and hexamethylpararosaniline chlorides. For direct application, a solution of from 1:500 to 1:1,000 may be employed; for instillation, a 1:10,000 solution. For intravenous use, 5 Mg. per Kg. of body weight, injected in 0.5 per cent. solution has been used.

UNFAVORABLE SMALLPOX OUTLOOK FOR 1924

DURING the first six months of 1924, in 26 of the United States and in seven Canadian Provinces, the number of cases of smallpox nearly doubled the number recorded during the same period in 1923! What makes the matter worse is that this year's smallpox is nearly three times as deadly as the type of the disease which prevailed in 1923! The seven Canadian Provinces show an increase in smallpox cases from 714 in the first six months of 1923 to 1,837 during the corresponding period of 1924. Last year, these

Canadian areas recorded one death between January and July; this year 51 deaths occurred.

We pointed out in our March Bulletin that there was little comfort in the temporary abatement of smallpox during 1923, and that possibly this year we were to have a renewal of this threat against the safety of the American population. There are too many areas where populations are indifferent, indeed obstructive, to thoroughgoing vaccination. Does the current year's experience leave any room for doubt that unless a favorable country-wide sentiment for vaccination is developed, we may face a holocaust of virulent smallpox? Take Detroit, as an example. With a Health Department of the highest scientific and administrative equipment doing all that it could to encourage protection of an indifferent citizenship, smallpox became epidemic in that city in the latter part of 1923. Up to June 30, 1924, 1,508 cases and 140 deaths had occurred. Fortunately, it was possible finally to arouse the population to the presence of the epidemic and through the efforts of the City Health Department and associated agencies, 500,000 vaccinations were made, in addition to the care and supervision given patients and their families. In Pittsburgh, a severe outbreak began about the middle of June, with 55 cases and 11 deaths reported up to July 19th. Vaccination measures were instituted and it is hoped to have 95 per cent. of the exposed population protected shortly. These are only two instances of many, where smallpox has invaded populations which thought they were safe and could, therefore, neglect the safeguarding of infants and children through vaccination. The menace of smallpox is not confined to definite geographic regions. It appears in all parts of the United States, wherever there is the tinder of an unvaccinated population and the flame of an infected individual. In the following table we show the facts at present available, for the first half of the current year and of the two preceding years:

NUMBER OF CASES AND DEATHS AND DEATHS PER 100 CASES FROM SMALLPOX, CERTAIN STATES AND CANADIAN PROVINCES, FIRST SIX MONTHS OF 1924, 1923, 1922

	1924			1923			1922		
Area	Cases	Deaths	Deaths per 100 Cases	Cases	Deaths	Deaths per 100 Cases	Cases	Deaths	Deaths per 100 Cases
United States (26 States)	22,682	312	1.4	12,682	64	.5	13,001	84	.6
Canada (7 Provinces)	1,837	51	2.8	714	1	.1	1,278	2	.2
United States and Canada	24,519	363	1.5	13,396	65	.5	14,279	86	.6

—*Bulletin Metropolitan Life Insurance Co.*

Note: If you do not keep your JOURNALS cut this out and send to your Senator or Representative.

PRETUBERCULAR CAMP OF ESSEX COUNTY

DURING the months of July and August the Associated Tuberculosis Leagues of Essex County maintained a camp at Middleton for the benefit of underweight children who were known tubercular contacts but not demonstrably infected.

This attempt was made possible through the courtesy of the County Commissioners who submitted the use of the pine grove upon the hill above the Sanatarium and were coöperative in many ways. The actual management was in the hands of Dr. Pettengill, the Superintendent. The financial burden was borne by the several local Tuberculosis Leagues participating in the experiment.

Thirty-eight children were cared for during a period of two months each. All gained in weight and improved in general health.

This is believed to be a most practical measure for the prevention of tuberculosis and it is hoped that sufficient financial backing may be secured to enable a larger demonstration another year.

W. T. H.

MAINE DEPARTMENT OF HEALTH

REPORT OF INFECTIOUS DISEASES FOR THE WEEK ENDING SEPTEMBER 27, 1924

Chickenpox		*Gonorrhea*	
Boothbay Harbor	1	Bangor	4
Fairfield	3	Fort Fairfield	1
	—	Greenville Junction	1
	4	Mechanic Falls	1
		Millinocket	1
Diphtheria		Portland	8
Fort Fairfield	1	Robbinston	1
Lewiston	3	Thomaston	1
Old Orchard	1	Warren	2
Stockholm	1	Waterville	2
	—		—
	6		22

Measles

Auburn	1

Mumps

Fairfield	1
Lewiston	1
Portland	7
	9

Pneumonia

Ashland	1
Madison	1
	2

Poliomyelitis

Auburn (suspected)	1
Brownfield (old cases)	3
Falmouth	1
Farmington	1
Franklin	1
Wilton	1
York	1
	9

Scarlet Fever

Eastport	1
Lewiston	3
Waldoboro	1
Wilton	1
	6

Syphilis

Auburn	1
Bath	1
Norway	1
Portland	5
South Paris	1
	9

Tuberculosis

Bangor	1
Biddeford	2
Jay	1
Lockes Mills	1
West Bath	1
	6

Typhoid Fever

Brownfield	1
Fairfield	1
Stockholm	2
	4

Whooping Cough

Charleston	2
Eustis	4
Madison	3
Medway	9
Presque Isle	4
Sanford	1
Waterville	7
	30

MASSACHUSETTS DEPARTMENT OF PUBLIC HEALTH

Diseases Reported for the Week Ending October 4, 1924

Disease	*No. of Cases*
Anterior poliomyelitis	17
Chickenpox	18
Diphtheria	108
Dog-bite requiring anti-rabic treatment	3
Encephalitis lethargica	5
Epidemic cerebrospinal meningitis	3
German measles	4
Gonorrhea	105
Influenza	8
Malaria	1
Measles	44
Mumps	38
Ophthalmia neonatorum	18
Pneumonia, lobar	44
Scarlet fever	126
Syphilis	54
Tetanus	1
Suppurative conjunctivitis	16
Tuberculosis, pulmonary	97
Tuberculosis, other forms	18
Typhoid fever	29
Whooping cough	40

THE INTER-STATE POST-GRADUATE ASSEMBLY OF AMERICA

The Tri-State District Medical Association, under the direction of which the Assembly is conducted, takes its name from the fact that this organization started as a district association in 1916. While it still retain its old name, its rapid growth and development as a post-graduate organization has necessitated including the entire medical profession (in good standing) of America in its membership and activities.

A physician, in order to become a member of this Association or to participate in its activities, must be in good standing in the State or Provincial Society in the territory in which he or she resides and no physician, unless he be so accredited, will be admitted to the privileges of the clinics, on the tour, either in America or in Europe.

The time of the officers of this Association is too valuable to be contributed to the furtherance of any object except one that is of great intrinsic value to the profession. This is a thousand times more true in regard to the time and talents of the distinguished teachers of medicine who are coöperating with us in our work. These services are gladly given that the physicians of America may receive inspiration from the master minds of the medical profession, which will lead them to higher ambitions and greater achievements.

The officers of this organization have been at work on plans for this tour since the fall of 1923. It was with the idea of furthering the main object for which this organization was founded, i. e., post-graduate work, that has made it possible for the average man practising medicine in out-of-the-way places, as well as for those in the cities, to visit the great medical centers of Canada and Europe and there observe the work of the foremost men in medicine in those countries.

The clinic tour to Canada and to Europe will be conducted mainly for scientific study, but it will also provide an opportunity to visit places of historic interest abroad. It will thus be possible for the physician, whose time is valuable, to combine an intellectual feast along professional lines with all the pleasures and advantages of general travel.

In order to save both time and money and avoid uncertainty in the matter of expense, the management has contracted with the Temple Tours of Boston to manage the business affairs of the trip. All correspondence regarding travel matters should be addressed to them, and all correspondence regarding clinical or professional matters to Dr. Peck, Managing Director, Freeport, Ill.

The circular of information gives minute details of committees and arrangements for the professional features and the travel opportunity.

SMALLPOX IN ENGLAND AND WALES

In 1924 up to the end of the second week in September, smallpox has appeared in 91 sanitary districts in England and Wales, including four port sanitary districts. The total number of cases is approximately 2,750 as compared with 1,840 in the corresponding period of 1923. The county most heavily invaded is Derby, with a total of approximately 1,080 cases in 16 sanitary districts; the next in point of number is the contiguous county of Nottingham with 434 cases in 10 sanitary districts; 386 cases have occurred in Yorkshire (mainly in Middlesbrough), and 306 in Northumberland (mainly in Ashington).

THE COST OF SICKNESS

Sir David Bruce claims that the direct loss to England and Wales is £150,000,000 from sickness and disability and in the United States is £600,000,000 per year.

He claims that medicine must change its strategy and assume a more definitely offensive attitude. In addition to known preventive measures Sir David Bruce feels the careful application of dietary rules promises very much more than is generally recognized.

NEWS ITEM

LAWRENCE MEDICAL VETERANS CLUB

At a meeting of the Lawrence Medical Veterans Club at the Methuen Tavern, Methuen, Thursday, October 2, 1924, at 8:00 P. M., papers were presented by A. J. Leary, M. D., upon Roentgen findings on two cases of diaphragmatic hernia, G. S. Allen, M. D., upon "Hydrophobia" and V. A. Reed, M. D., upon "A History."

DEDICATION OF NEW HOSPITAL FOR JOINT DISEASES

The President and Directors of the Hospital for Joint Diseases, New York, recently announced the completion of their new hospital, Madison Avenue, 123rd to 124th Streets. Invitations were issued to inspect the building and attend the dedication on Sunday afternoon, October the fifth, at 3:30, and Monday, October the sixth, from 7:30 to 10 P. M., one thousand nine hundred and twenty-four.

LAWRENCE GENERAL HOSPITAL

The annual meeting of the Staff of the Lawrence General Hospital was held at 11 A. M. on Monday, October 6, 1924, at the Nurses' Home. Election to the Medical Staff and other regular business was as follows:

G. B. Sargent, M. D., of Lawrence, elected President.

F. D. McAllister, M. D., elected Secretary.

F. B. Smith, M. D., of No. Andover, elected to Medical Staff in place of J. J. O'Sullivan, M. D. (deceased).

Voted to form a hospital unit in reserve under plans of Medical Dept. of U. S. Army.

WEST END NEIGHBORHOOD CONFERENCE

Dr. **Charles F. Wilinsky** announces the resumption of the West End Neighborhood Conference on Friday, Oct. 17, 1924, at 3.30 P. M. The meetings will be held each month through the fall and winter.

Miss Mabel C. Bragg, Assistant Superintendent of the schools of Newton, will speak on Health Education at this first meeting. Miss Bragg's work has received national recognition.

BOSTON HEALTH DEPARTMENT WILL BE REPRESENTED AT THE MEETING OF THE AMERICAN PUBLIC HEALTH ASSOCIATION

Due to the illness of Dr. William H. Park it is probable that Dr. Francis X. Mahoney, Health Commissioner, Boston Health Department, will preside at the General Sessions and the Sessions of the Governing Council of the 53rd Annual Meeting of the American Public Health Association at Detroit, from October 20th to 23rd.

Dr. Charles F. Wilinsky, Director of the Blossom Street Health Unit, is to read a paper at the 53rd Annual Meeting of the American Public Health Association at Detroit, on October 20th. The subject of the paper is "The Correlation of Official and Unofficial Agencies in the Public Programme."

REMOVALS

Dr. Wm. M. Gay has moved from Oteen, N. C., to Tupper Lake, N. Y., U. S. V. Hosp. No. 96.

Dr. L. M. Freedman has moved his office from 418 Boylston St. to 475 Commonwealth Ave., Boston.

Dr. Flora M. Poland has moved from Lowell (Middlesex North) to Winthrop (Suffolk) where she has an office at 37 Temple Ave.

Dr. Boris Greenberg now has his address at the Beth Israel Hospital, Roxbury.

Dr. Newton C. Browder has been transferred from Worcester to Suffolk, 496 Commonwealth Ave., Boston.

Dr. Warren G. Atwood has been transferred from the Suffolk to the Bristol South District. He has an office at 151 Rock St., Fall River.

ADDRESS UNKNOWN

William Rufus Redden, formerly of Boston.

Dr. Archibald McMillan has moved from 274 to 332 Broadway, Lawrence.

Dr. George H. Francis has returned from his trip abroad. His address is Brandon Hall, 1501 Beacon St., Brookline.

Dr. Lawson G. Lowrey has moved from Minneapolis to Cleveland, Ohio, 10809 Clifton Boulevard.

Dr. T. Chittenden Hill has changed his office from 270 Commonwealth Ave. to 315 Marlborough St., Boston.

Dr. Francis W. Milward of Cleveland, Ohio, has moved to 2307 Lee Rd., Sta. E.

Dr. Harold H. Brittingham has changed his Cleveland, Ohio, address to 2195 Demington Drive.

Dr. Clara Loitman has moved from Roxbury to New York City where she is at the Willard Parker Hospital, 16th St. & Ave. C.

Dr. Ben H. Metcalf has changed his address in Phoenix, Arizona, to 738 E. Willetta St.

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NOTICES

LECTURES AT THE HARVARD MEDICAL SCHOOL UNDER THE EDWARD K. DUNHAM LECTURESHIP

The Faculty of Medicine of Harvard University has arranged for two lectures to be given under the Edward K. Dunham Lectureship for the Promotion of the Medical Sciences on "The Relation of the Mechanical and Electrical Phenomena of Muscular Contraction with Special Reference to Cardiac Muscle," by Willem Einthoven, M. D., Ph.D., LL.D., Professor of Physiology, University of Leyden, Tuesday, October 21, and Wednesday, October 22, at five o'clock at the Harvard Medical School Amphitheatre, Building C.

CENSORS' MEETING

The Censors of the Suffolk District Medical Society will meet for the examination of candidates at the Medical Library, No. 8 The Fenway, Thursday, November 6, 1924, at 4.00 o'clock.

Candidates should make personal application to the Secretary, and present their medical diploma at least one week before the examination.

Lesley H. Spooner,
Secretary.

520 Commonwealth Avenue, Boston.

THE TRI-STATE ASSEMBLY

The next session will be held in Milwaukee, Wisconsin, October 27, 28, 29, 30 and 31, 1924.

Reservations are to be made through the Management of the Headquarters Hotel, and individual hotels or Dr. Edwin Henes, Jr., Secretary, 445 Milwaukee St. Headquarters: Hotel Pfister.

Massachusetts State Nurses' Association will hold the autumn meeting October 24 and 25, 1924, Northampton, Massachusetts. An attractive program has been arranged.

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SOCIETY MEETINGS

Bristol South Medical Society

Next meeting will be held Thursday, November 16, 1924.

Essex North District Medical Society

January 7, 1925. Semi-annual meeting at Haverhill.
May 6, 1925. Annual meeting at Lawrence.

Hampden District Medical Society

Meetings to be held on the third Tuesday of January and the third Tuesday in April.

Dr. William J. Mayo is expected to attend the combined meeting of the four western Districts to be held in Springfield in October.

Hampshire District Medical Society

The meetings will be held the second Wednesday of November, January, March and May.

Dr. Channing Simmons will deliver an address at the November meeting. Title: "The Treatment of Cancer, with Especial Reference to Radiation."

Middlesex East District Medical Society

Wednesday, November 19. Harvard Club. Dr. George K. Pratt, "Community Aspects of Psychiatry."

Wednesday, January 21. Harvard Club. Dr. Franklin K. White, "Diagnosis of Gall-Bladder Disease."

Wednesday, March 18. Harvard Club. Dr. John H. Cunningham, "Urinary Retention: Its Significance and Treatment."

Wednesday, April 15. Harvard Club.

Wednesday, May 13. Colonial Inn, North Reading.

Middlesex North District Medical Society

January 28, 1925.
April 29, 1925.

Middlesex South District Medical Society

The fall meeting of the Society was held on Wednesday, October 8, 1924, at the Newton Club, 345 Walnut Street, Newtonville, at 11.30 A. M. Subjects: 1. "Objective Evidences of Endocrine Disturbance," by Dr. A. W. Rowe, of the Evans Memorial. 2. "Subjective and Clinical Evidences of Endocrine Disturbance," by Dr. Charles H. Lawrence.

Winter Schedule—The plans for winter meetings of the Society include the stated meetings in October and April, two hospital meetings, and five meetings to be held in conjunction with the Suffolk District Medical Society and the Boston Medical Library (two surgical, two medical, and one general).

Norfolk District Medical Society

October 28, 1924. Boston Tuberculosis Hospital, Mattapan. Subject: Tuberculosis. Speakers: The Superintendent and Drs. Kelley and Remick.

November 25, 1924. Masonic Temple, Roxbury. Subject: Diabetes—with especial reference to insulin. Speakers: Dr. Joslin and probably one other.

January 27, 1925. Masonic Temple. Subject: "Some Trends of Medical Teaching and Medical Practice." Speakers: Drs. A. S. Begg and W. P. Bowers.

February 24, 1925. Masonic Temple. Subject: "The Need of Periodical Physical Examinations and How to Make Them." Speaker: Dr. Francis H. McCrudden. A second speaker will be selected to present another subject at this meeting.

March 31, 1925. Tufts College Medical School. This meeting given over to Drs. Leary and Watters for the purpose of giving us a medical examiners' talk.

Norfolk South District Medical Society

Meetings will be held the first Thursday of each month from October to May, inclusive, at 12 noon, at the Norfolk County Hospital, South Braintree.

Dr. T. O'Donnell, District Health Officer, will read a paper at the meeting to be held October 2.

Suffolk District Medical Society

October 29. Stated meeting. "The Nullity of Psychoanalysis as a Scientific Concept," Dr. Joseph W. Courtney.

November 12. Surgical Section, in association with the Middlesex South District Medical Society. "The Treatment of Septicemia by the Newer Methods," Dr. Edward B. Pieper, Philadelphia, Pa.

December 17. Medical Section, in association with the Middlesex South District Medical Society. "The Newer Drug Treatment of Heart Disease," Dr. Paul D. White.

January 28. General meeting, in association with the Boston Medical Library and the Middlesex South District Medical Society. "Some Experiences of a Medico-legal Pathologist" (lantern slides), Dr. George B. Magrath.

February 25. Surgical Section, in association with the Middlesex South District Medical Society. "Pyelonephritis," Dr. Arthur H. Crosbie.

March 25. Medical Section, in association with the Middlesex South District Medical Society. "The Treatment of Pneumonia," Dr. Edwin A. Locke.

April 29. Annual meeting. "Hypertension and Longevity," Dr. Harold M. Frost.

Worcester District Medical Society

November 12, 1924. Grafton State Hospital. Dr. Charles Macfie Campbell of the Psychopathic Hospital, Boston, will speak on "Nervous Disorders in Children."

December 10, 1924. Worcester State Hospital. Subject and speaker to be announced.

January 7, 1925. Surgical meeting. Place, subject and speaker to be announced.

February 11, 1925. Memorial Hospital, Worcester. Papers will be read by the members of the hospital staff.

March 11, 1925. St. Vincent's Hospital, Worcester. Papers will be read by the members of the hospital staff.

April 9, 1925. Subject and speaker to be announced.

May 14, 1925. Annual meeting.

The Clinical and Surgical Association of Massachusetts

This Association will hold its semi-annual meeting at the Toronto General Hospital, Monday and Tuesday, October 20 and 21, where a special clinic has been arranged for its benefit.